Roberta Capello *Editor*

Seminal Studies in Regional and Urban Economics

Contributions from an Impressive Mind

Springer

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In Honour of Roberto Camagni

Foreword

1. A Book in Regional and Urban Economics

A retirement is in general honoured by a book in which friends and colleagues write new scientific contributions. The long, vast and interesting research programme produced over 45 years in the field of regional and urban economics by Roberto Camagni has suggested a different solution, that of collecting his main seminal ideas so as to provide a general framework of his work. In this way, the book can easily be the basis for a Ph.D. course in regional and urban economics, since it contains a collection of seminal works in the discipline which provides interesting insights into a broad set of crucial themes and issues at the basis of regional science. The book also offers an example for young scholars on how to build a personal scientific research programme.

As the structure of the book shows, Roberto Camagni has worked in several fields of regional and urban economics. His way of approaching research activities clearly emerges from his works. Roberto has always started from either a scientific (endless) debate or a new idea launched in the policy field, offering his own definition of the concept in a rigorous and convincing way. On this definition, he built his theoretical/conceptual framework, supported by rigorous empirical analysis and sound policy recommendations.

The fields of research tackled by Roberto Camagni are numerous. As the book shows, he covered largely the fields of regional competitiveness, providing, as was always his style, a sound definition and new theoretical and conceptual approaches on the interpretation of regional competitiveness; thanks also to the support of his school, he offered on this concept rigorous empirical analyses on which to launch sound policy implications and suggestions. Regional innovation adoption and creation have always been of interest for Roberto; in this field, he provided important contributions on how space can actively play a role in defining the heterogeneous trajectories that one can register in innovation adoption and creation.

Urban economics is a field where Roberto provided much of his contributions. In this book, one can enjoy his revolutionary ideas on urban sustainability, urban dynamics, the optimal size of the city and his conceptual approach to city networks.

All these contributions open the reader's mind towards new conceptions of important issues through which the city and its dynamics can be interpreted.

The last part is full of original Roberto's ideas in regional policies and spatial/urban planning. The reader can appreciate a rich and cultured debate on the best design and implementation of regional and urban policies and can find sound economic justifications for their existence, put under severe doubt by some mainstream economists, like our friend, the Nobel Prize winner, Paul Krugman.

The introduction to the book, and those to the three distinct scientific parts, written by his friends Roberta Capello, Juan Cuadrado-Roura, Denise Pumain and Peter Nijkamp, helps readers to grasp the most important ideas that characterise Roberto's research programme. Thanks to their deep knowledge of Roberto's scientific work, his friends could effectively synthetise the main ideas contained in the book and they could find a way to guide a passionate reader through further sources of inspiration in other publications of Roberto.

2. The Encounter with Roberto Camagni

In 1983, the former president and founder of the Association of French Regional Science (ASRDLF), Jean Paelinck, introduced us to a young Italian professor (born 21 December 1946) at the meeting of the association: Roberto Camagni. As a new president of the ASRDLF, I was immediately impressed by his presence, his mastery of the French language, and his beginning career. Even if we studied in different countries, our final training had been at Pennsylvania University in regional science, for him in 1976–1977 and for me 10 years earlier, where Walter Isard, the "professor", marked our ways of thinking spatial and economic problems. We are all disciples of Walter Isard, whose way of thinking is what made Roberto—during his work within the European Research Group on Innovative Environments (GREMI)—highlight "the role of the local milieu as a generator of innovative behavior" to use "collective learning processes that enhance local creativity and the capacity for technological creation" (Camagni 1991, pp. 2–3). Roberto has always been concerned with the relationship between the city and the innovative environment (Camagni 1992; Camagni and Crevoisier 2000) to promote natural, social and cultural resources in the spirit of the founder of regional science. Territories are no longer passive places where firms locate following an economic maximising behaviour but areas able to create specific resources.

3. Regional Science in Europe and in Italy

This career as an economist and regionalist led Roberto to the presidency of the Associazione Italiana di Scienze Regionali (AISRe) from 1985 to 1992 and then to the presidency of the European Regional Science Association (ERSA) 2003–2005. We met so many times, in official meetings or in hotels at breakfast, with his friendly wife. In the same period, I was President of the Regional Science

International (2003–2005). We participated in same conferences, and we received same invitations in high-level scientific regional science venues, for instance in Aosta, for the joint colloquium of the Italian and Francophone Association.

4. The Emphasis on the Urban

His experience in urban economics, his role as Director of the Department of Urban Affairs under Prime Minister R. Prodi (1997–1998) and his vice-chairmanship of the OECD Committee of Urban Affairs urged him to focus on the role of cities in sustainable economic development. His knowledge in urban theories brilliantly emerges in his textbook on Economia Urbana (1992) and in his book on Urban milieux (2000). Social capital and agglomeration economies play a major role in the culture of urban areas and territories, the *raisons d'être* of cities. The city, a collective actor, generates cooperation processes, the basis for territorial development. His city concept is close to the "milieu" one but at the same time moves away from it: agglomeration means proximity but also density and intersectoral integration; it is not limited to a specialised production system. Today, much of the literature on urban policies refers to "The need to create cohesion and synergy between the different urban actors, and to build social capital" (Camagni and Maillat 2006, p. 451). In other words, the need to create an urban "milieu".

5. A Wise Political Player

Elegant in style, as in life, Roberto broadened the scope of our approaches. He proved it at the presidency of the ERSA in front of British colleagues, showing his fair play. He supported me, on behalf of ERSA, to create the Universal Membership, a way for all members of national associations to subscribe for less than $10 to the Regional Science Association International (RSAI) with access to journals and publications. Roberto understood the role of a global association in an open world, while some considered only their section or continent, disregarding the evolution of others (especially the Asian and South American continents). Thus, while he often defended "bottom-up" approaches to understand urban social processes, Roberto had a global vision of regional science, which he developed as vice president of the Urban Affairs Committee of the OECD. Theoretical approaches to understand urban and regional development and the continuous attempt to broaden the conceptual thinking in our disciplines were his main goals.

6. The Professor

In his 45 years of active professorship, Roberto was able to form three generations of researchers. First, Roberta Capello, Francesca Gambarotto, Tomaso Pompili and Roberta Rabellotti, then Andrea Caragliu, Ugo Fratesi, Camilla Lenzi and Giovanni

Perucca, and the youngest Silvia Cerisola and Alessandro Toppeta. Their feelings of attachment and gratitude to their mentor shine through their words, which the reader can enjoy in the last three parts of the book. These personal words give a view on the human side of Roberto, complementing that of an excellent scientist, presented in the first three parts of the book.

Thanks to Roberto, Italian regional science became more dynamic, at the forefront of research in regional and urban economics. All this is not the end of the story; Roberto still continues his scientific work through publications and conferences in regional and urban economics studies as well as in regional policies and spatial planning. Retirement will be active! This seminal book illustrates the richness of his work, to be used by all colleagues and students.

Crans-Montana, Switzerland   Antoine Bailly

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Regional Competitiveness, Territory and the City: The Research Programme of an Impressive Mind

1

Roberta Capello

1.1 Introduction

Sixty years since the publication of the seminal work "Location and the Space Economy" by Walter Isard (Isard 1956), regional and urban economics has achieved full recognition as a stand-alone economic discipline able to incorporate the dimension 'space' into analysis of the workings of the market by including space in logical schemes, laws and models which regulate and interpret the formation of prices, demand, productive capacity, levels of output and development, growth rates, and the distribution of income in conditions of unequal regional endowments of resources (Capello 2007a). Urban economics today embraces rich and complex theories and tools able to produce general powerful representations and conceptual pictures of the city and of urban systems, of their formation and evolution (Camagni 1992a). The knowledge accumulated in these 60 years is ample, rich, and stimulating, and it is able to open a scientific mind to the interpretation of spatial phenomena.

The discipline owes its evolution to impressive minds which have sometimes courageously contested general beliefs by introducing innovative counter-intuitive definitions, concepts, theories, methods, and interpretations to move the knowledge frontier further forward. One of these minds is certainly that of Roberto Camagni, who spent all of his working life in search of new approaches, theories and methods to explain the "unexplainable", to measure the "unmeasurable", to know the "unknown". He never denied the importance of what colleagues and friends had discovered, but he was never satisfied with what was already present in the literature. Always using others' new publications as the basis on which to provide his own contribution, and always with an eye to normative debates, Roberto provided an impressive number of new theories, concepts, and methods. He thus enriched the

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discipline with theoretical tools to interpret the role of space in different economic phenomena ranging from regional competitiveness to the interpretation of the city and of urban systems, their formation and their evolution. He furnished useful suggestions on what he considered to be the most efficient design and implementation of regional policies and spatial planning. Roberto's retirement in November 2017 gave me an excuse to revisit his contribution to Regional and Urban Economics. From his efforts, only partially presented in this book, there emerges an impressive life-long research programme, the product of an outstanding scientific mind.[1]

This book contains examples of Roberto's creativity. It gives an interested reader the opportunity to discover other ideas or to explore those presented here more deeply by reading the large number original publications that he produced in his career.[2]

The aim of this introductory chapter is to guide the reader through Roberto's seminal ideas, linking one to another so as to provide the general framework of his extended research programme. I had the great fortune to work with this inspiring mind for more than thirty years, and to build my own research programme on its products. At some stages of Roberto's professional life, I had the chance to help his ample research programme to grow, become richer, and form a particular "school of thought", now known as the "school of Regional and Urban Economics of the Politecnico di Milano". I am sure that Roberto's retirement is only a formal step in his life, which cannot limit a vivid mind like his. His presence will continue, and it will guide our research group for many years to come.

1.2 Specificities and Phases of a Rich and Comprehensive Research Programme

Roberto Camagni's research programme covers a vast number of issues and themes in regional and urban economics. They range from the definition, formation and determinants of regional competitiveness to the economic justifications of the existence of the city (and urban systems) and the economic laws of their growth. Despite the extent of the studies treated, Roberto's contributions are marked by specific features which characterise his research programme:

– his constant effort to reject the trivial concept of space and to embrace that of territory, with the constant endeavour to highlight the active role of space in economic phenomena. No longer a simple geographical container, space was conceived in Roberto's research programme as an economic resource in itself, as a reducer of uncertainty and risks, of dynamic increasing returns and externalities reinforcing innovation processes at local level. With this idea,

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[1]Annex 1 to this book reports the impressive curriculum vitae of Roberto Camagni.

[2]Annex 2 to this book contains a long list of Roberto Camagni's publications, organized by his main themes of research which will be presented in details in this introduction.

Roberto enriched the best tradition of Italian seminal works on industrial districts (Becattini 1975, 1990) with the interpretation of space as the generator of dynamic advantages for firms, and as a key determinant of a local production system's competitiveness and growth;

– his belief in a multidisciplinary approach to interpreting urban phenomena. Roberto has always been fascinated by the explanatory power of pioneering models of urban growth *à la* Tiebout and Czamanski of the 1960s and 1970s, of spatial interaction models, and of more recent self-organisation and multi-agent approaches. Roberto particularly appreciated these models for their capacity to produce general powerful representations and conceptual pictures of the city that a pure economic approach was unable to provide;

– his merging of mainstream, mainly neoclassical, economic approaches with more heterodox, evolutionary but also classical economic ones. In Roberto's approach, the city (like the territory) is frequently considered to be a sort of collective economic concept, or even a collective agent, extending beyond the traditional methodological individualism of mainstream economics which considers individual agents alone: "if individual firms and individual people undertake collective activities, facilitated by (and creators of) trust and local social capital; and if significant cognitive synergies, readily apparent in the local *milieu*, result from their various interactions; and, finally, if these actions and these processes draw additional vitality from cooperation with local administrations; then it appears justifiable to go beyond methodological individualism—which regards only single firms and individuals as operating and competing—and to argue for the logical validity of a 'collective' concept such as that of *territory* (and city), and to affirm that territories (and cities) compete among themselves, using the creation of collective strategies as their instrument" (Camagni 2002, pp. 2406; Chap. 5);

– his scientific deductive research method, which imposed as the starting point of the analysis clear definitions of the concepts treated. This way of proceeding was at the basis of his constant attention to clear, linear and measurable interpretations of concepts, which were often confused and fuzzy in the literature. Concepts like regional competitiveness, territorial cohesion, urban sustainability, territorial capital, to mention only some of them, found in Roberto's definitions an interpretation which became a source of inspiration for many scholars, and a way out of confused and mainly inconclusive debates around them;

– his attention to overcoming the limitations of well-known theories by identifying (mis-)interpretation of concepts, by (re-)formulating them, obtaining a clearer idea of what was meant, by adding often a dynamic perspective, requiring himself to achieve new "paradigms" in the interpretation of well-known or even new phenomena, accepting the risk of being criticised and rejected by traditional schools of thought;

– his tendency to apply a dynamic perspective to interpret the reality, with the strong belief that the interpretation of the evolution of territorial processes is the basis for sound regional policies and spatial planning;

– his search for sound and methodologically rooted empirical analyses that could prove the validity of his new and innovative theoretical concepts, theories and models.

Roberto's long research programme emerged smoothly. It went through natural phases of a mental evolution: from an early stage, in which Roberto already showed an outstanding capacity to produce new ideas, followed by a period of exponential growth of ideas, theories, concepts and definitions in different fields of regional and urban economics, until full maturity where he merged his knowledge with his arts of leadership and diplomacy in guiding his research group in the strong international competition in scientific research, with a high degree of success. All these phases were characterized by an impressive and admirable scientific creativity (Table 1.1).

The early phase took place between the mid-1970s and 1980s, when Roberto's interests were mostly focused on Regional Economics; it is, however, in this period that his passion for urban issues started to emerge. Seminal ideas—like the definition and measurement of regional competitiveness, the role of territory in local knowledge creation (the milieu innovateur theory) (Camagni 1991a; Chap. 4), the "efficient, rather than optimal, urban size" contained in the SOUDY model (Camagni et al., 1986; Chap. 9), the formation of urban rent (and income distribution) between the city and the countryside (Aydalot and Camagni 1986) (Table 1.1)—were developed in those early years. The influence of the French school of Philippe Aydalot, of the GREMI (Groupe de Recherche sur les Milieux Innovateurs) group, the cooperation with Italian colleagues (Riccardo Cappellin for the regional competitiveness analyses, and Lidia Diappi and Giorgio Leonardi, two eminent system analysts, for urban studies), were crucial in that early period.

The 1990s and 2000s were Roberto's most active period, in which he produced an unbelievable and admirable number of seminal works in all fields of Regional and Urban Economics (Table 1.1). In 1992, he published his Urban Economics textbook (later translated into French and Spanish, but unfortunately, to my great regret, never into English!), the first (and to date only) textbook in that discipline published by an Italian (Camagni 1992a). In regional economics, it was in this rich and active phase of his life that Roberto published a constructive criticism of Paul Krugman's provocative statement that regions and cities compete on the basis of relative comparative advantage *à la* Ricardo, with the rather dangerous consequence that regional policies have no reason to exist (Chap. 5). It was also in those years that Roberto provided evidence of the importance of national (macroeconomic) effects on regional development. He demonstrated a clever scientific balance between macro-economists, who neglected all sorts of regional effects of national policies, and regional economists, at that time concentrated on reinforcement of the "endogenous regional growth model" launched in the 1970s by the industrial districts theory, and who therefore obsessively denied any kind of role of national economic phenomena in regional growth (Camagni and Capello 1990). It was in that period that Roberto became interested in urban planning. Under the influence of his wife, Maria Cristina Gibelli, Roberto's interest centred on what was

Table 1.1 Roberto Camagni's seminal concepts, theories and methods: a diacronic perspective

	Phases		
Research areas	The early phase (mid-1970s–1980s)	The exponential phase (1990s–mid-2000s)	The maturity phase (mid-2000s–onward)
Regional economics			
Definition and measurement of local competitiveness	Measurement of productivity gains	Regional competitiveness: definition and measurement	Macro-econometric regional growth forecasting model (MASST model)
Sources of local competitiveness	Intra and inter-sectoral productivity gains	Regional impacts of national effects Absolute vs. relative comparative advantages	Territorial capital as a new concept
Sources of endogenous innovation	Context conditions in spatial diffusion processes of innovation Milieu innovateur theory		Regional innovation patterns
Urban Economics			
Urban economic theory		Five principles governing a city	
Optimal city size and agglomeration economies	The Soudy model	Beyond optimal city size theory	Dynamic agglomeration economies
Urban crisis and urban success	Income distribution between city and non-city	Income distribution between two types of remuneration (through a prey-predator model) The city as a milieu	
Urban rent		Absolute vs. differential urban rent	
Urban systems		City networks theory	
Urban sustainability and urban form		Urban sustainability: definition and measurement	
Regional policies and spatial planning			
Regional policies		Regional development policies through the milieu innovateur concept The regional impact of macroeconomic policies	The overcoming of the traditional efficiency vs. equity trade-off Smart innovation policies
Spatial planning		Strategic planning Spatial planning: modern principles and goals	Territorial cohesion: definition and measurement Territorial impact assessment (TEQUILA model)

then a new approach to urban planning, known as "strategic planning", and soon became an advisor to most of the Italian municipalities interested in launching a strategic plan for their city (Gibelli 1996; Camagni 1996a). It was in that period that Roberto entered the field of "urban sustainability". He provided a measurable definition of this concept, and launched a large research programme, leading a multidisciplinary group of economists and planners. The result was a rich interpretation of urban sustainability from both the economic and territorial perspectives (Camagni 1996b, 1998; Chap. 13).

From the mid-2000s onwards, Roberto reached full maturity, guiding his research group in many innovative research projects won through tough competition at international level. One of the most interesting projects—which became a research programme for more than 10 years—was the implementation of a macroeconometric regional growth forecasting model whose acronym contained the various dimensions—Macroeconomic, Sectoral, Social and Territorial (MASST)—on which it was based (Capello 2007b; Capello et al. 2008, Capello and Fratesi 2012; Capello et al. 2011a, b, 2014; Camagni and Capello 2012; Chap. 7). The MASST model is now very well known at the international level, and it is considered a useful and powerful tool with which to build scenarios for European regions under different assumptions of future European, national, and regional economic trends. A second extraordinary achievement in his maturity was to guide his research group to the interpretation of regional innovation patterns, which proved to be a conceptual framework extremely useful for achieving a balanced approach with respect to the two extreme general beliefs on which innovation policies were developed: the former inclined to interpret R&D as the only tool with which to increase regional innovativeness; the latter calling for the opposite situation of leaving each region to identify its own innovation (smart) specialization (Camagni and Capello 2013; Chap. 16). It was in this phase that Roberto took up the challenge issued by the European Union to define "territorial cohesion". He did so by developing a clear and measurable definition of this fuzzy concept, and he launched a simple and effective method to assess the impact of programmes and projects on territorial cohesion (Camagni 2006; Chap. 20) which was applied in many studies and cited by several authors. It was also in those years that Roberto developed the concept of "territorial capital". This notion synthesised all potential assets for regional growth, by underlining the economic nature of each of them, and especially each single law of accumulation and depreciation, on which to base appropriate regional policies (Camagni 2009a; Chap. 6).

The richness of Roberto's ideas and the *fil rouge* linking them emerge from the more in-depth analyses of his works presented in the following sections.

1.3   On Regional Economics

1.3.1   On the Definition and Measurement of Regional Competitiveness

In the mid-1980s regional competitiveness was interpreted as the result of a sectoral composition. It was a source of productivity gains because it affected the regional aggregate pace of technical progress. In his studies together with Riccardo Cappellin on sectoral productivity and regional growth for the European Union, Roberto explained for the first time that sectoral productivity is only part of the story; region-specific, intersectoral factors were interpreted as determinants of the mobility of resources, horizontally affecting all sectors located in an area. Local tangible and intangible resources (the latter comprising trust, sense of belonging, cooperation) were analysed as sources of local firms' productivity despite their sectoral belonging (Camagni and Cappellin 1981, 1985). In this way, for the first time, the definition of regional competitiveness was based on productivity gains achieved through inter-sectoral factors and through a process of sectoral reallocation.

In the 1990s, regional competitiveness was seen as an elusive concept given the two different definitions provided of it: (i) an increase in the export-base of the region, focusing on export performance (Storper 1997; European Commission 1999; Rowthorn 1975); (ii) an increase in factor productivity (Krugman 1998; Porter and Ketels 2003). The two approaches seemed even contradictory. The former required an increase in the ratio between the general level of import prices and the level of export prices expressed in a common currency; competitiveness, in fact, increased when the denominator was reduced (due to a devaluation or a reduction in export prices) and tended to generate growth in exports (in volume) and employment. The latter was based on the opposite relationship (export prices on import prices), i.e. the terms-of-trade, since the basic idea that increasing the efficiency of the export sector meant being able to import the same amount of goods employing a lower quantity of local resources (this is mainly the case of process innovation), or to import more with equal utilization of local resources. In this case a reduction of export prices, and therefore an increase in competitiveness, resulted in a reduction of welfare.

Within this debate, Roberto offered a way out of this apparent unsolvable antithesis by claiming that: "the conflicting situation can be resolved by turning to a different measure of competitiveness: if it is true that 'it is better to sell with prices rising rather than falling' and that the problem consists in dealing with the expected fall in demand in a situation of rising prices, the answer, both conceptual and operative, is of increasing the attractiveness of local products by taking action on innovation, thereby breaking the static context, both conceptual and operative, of price competition. We thus come up in favour of a concept of non-price competitiveness" (Camagni 2002, p. 2399; Chap. 5).

In the field of statistical methods for the measurement of productivity gains, Roberto provided innovative approaches. In his 1985 study for the European

Commission with Riccardo Cappellin, he proposed a decomposition of the Theil index of disparities in productivity so as to capture different effects behind productivity disparities. With a simple decomposition of labour productivity levels at current prices in purchasing power parity into the multiplicative form of three indicators—labour productivity at constant prices, the relative evolution of internal prices relative to foreign prices, and the purchasing power parities index—the various effects explaining the evolution of productivity index could be disaggregated into: (i) effects due to technological factors, (ii) those determined by the market power of the various economies, such as the evolution of prices expressed in common currency, and (iii) the effects due to the relative evolution of internal prices relative to foreign prices, such as the evolution of the purchasing power parity index (Camagni and Cappellin 1985).

But this was not all that Roberto produced in the field of regional competitiveness measurement. Starting from the idea that productivity increases can take place within different structural processes, which affect the general performance of regional economies in rather different ways, Roberto suggested a statistical methodology with which to determine whether productivity gains are the outcome of growth of new and efficient firms, or rather of reconversion processes, the restructuring of existing production through process innovation, and abandonment of non-efficient productions (Camagni 1991b). To depict the various situations, Roberto suggested a method able to analyse three indicators at the same time on a chart: relative industrial employment growth, relative industrial productivity growth, and relative industrial GDP growth. In fact, when the first two indicators were plotted on two axes, a 45° negatively sloped line passing through the origin reflected a condition of GDP growth rate equal to the national average. A region might develop at the same rate as the national GDP either if both productivity and employment grew at the same rate as the national average, or if productivity increased at a lower rate but employment at a higher than average rate, and vice versa. Plotting these three indicators on the same chart identified six possible different structural situations, six *patterns of regional growth* (Camagni 1991b):

1. *virtuous cycle*, when higher-than-average productivity growth generates good performance in both employment and output;
2. *restructuring*, when a higher-than-average productivity growth is achieved through severe employment cuts, leading nevertheless to good output performance;
3. *dropping-out*, when productivity growth is achieved by closing down inefficient production units generating lower-than-average production growth;
4. *de-industrialization*, defined as a vicious cycle in which employment cuts are unable to restore competitiveness, a condition that perpetuates job losses and low output growth;
5. *industrial conservatism*, when poor productivity growth is accompanied (and sometimes explained) by a better-than-average employment growth, generally due to public assistance and industrial rescues;

6. *sheltered development*, when explicit or implicit assistance policies spur the initial development of the area, notwithstanding low productivity performance.

This methodology therefore made it possible to distinguish among very different situations hidden behind productivity gains: new and efficient firms, reconversion processes restructuring production through process innovation, dropping out of inefficient productions.

1.3.2 On the Sources of Regional Competitiveness

Given Roberto's interest in the definition and measurement of regional competitiveness, he could not avoid being attracted by the interpretation of the sources of productivity gains.

In this field, a first seminal contribution by Roberto was the idea that, in order to explain regional (local) competitiveness, emphasis must be placed on both endogenous elements (entrepreneurial capability) and external (macroeconomic and macro-territorial) conditions (Cappellin 1983; Camagni and Capello 1990, 2010). In the second part of the 1980s, when endogenous regional development theories were at their peak, especially in Italy, with their bottom-up perspective on regional growth (Becattini 1975; Dei Ottati 2003), Roberto entered the debate by signalling the limitations (refused and denied by its theoreticians) of such an approach. Roberto provided an interpretation that made it possible to overcome what he thought was a circular reasoning of the endogenous approach ("there is industrial development because there is entrepreneurship") and to reply to the question "why now and not before was development occurring in some areas?". He did so by refusing to put a pronounced and unique emphasis on endogenous aspects. He highlighted instead the importance of the contextual, inter-regional, and objective elements that accompany a development path.

According to Roberto, macroeconomic conditions exert an undeniable influence on the birth, development, and crisis of local areas. To prove this assertion, Roberto built a theoretical model in which both spatial interdependence and feedbacks taking place over time were summarised in the concept of a region's 'relative locational advantage'. This was measured by means of two indicators—productivity defined in the broad sense as the overall efficiency of the local social-productive system, and the cost of labour, also defined in the broad sense as the cost of 'labour force reproduction'—which were used to determine all the socio-environmental factors that affect the real purchasing power of wages in each region. Applied to the Italian case, relative locational advantages of the three Italian macro-regions very clearly evidenced the favourable conditions enjoyed by the North-East-Central (NEC) regions during the 1970s, and the contemporaneous loss of competitiveness by the North-West. These results were due to the manufacturing and exporting difficulties of the large industrial areas in Italy that led to general medium-period exchange rate weakness, and to a decrease in the cost of labour (expressed in international currency). The latter worked mainly to the advantage of the North-East and

Central (NEC) regions because of their specialization in labour-intensive 'tradable' manufactures with greater elasticity to price. Comparison between productivity and cost of labour evidenced the economic revival of the 'central' regions in the 1980s and—more interestingly—the crisis of relative competitiveness that hit some regions, especially those of central Italy: a crisis which was neither foreseen nor explained by industrial district theory (Camagni and Capello 1990).

In the 1990s the economist Paul Krugman launched the provocative argument in favour of the general validity of the Ricardian comparative advantage principle of countries also for regions and cities; Krugman's conclusion was that regional policies had no reason to exist since they played no role in local competitiveness (Krugman 1998). In front of this statement, Roberto could not resist reacting with a sound, solid and scientifically rooted critique of this statement.

In regard to the economic mechanisms behind regional competitiveness, Roberto stated that an appropriate reply to Krugman's position had not been found because different territorial levels of analysis had been mixed up, as if the same economic "laws" could apply equally to cities, regions and nations. Starting from these premises, Roberto highlighted that regions differ from countries in that they compete on the basis of an absolute advantage in the presence of exogenous shocks. The adjustment processes which restore equilibrium in international trade, at the basis of the principle of comparative advantages, in fact, do not work in the same way at national and regional level: at regional level, wages and prices are not sufficiently flexible, and exchange rate movements are not applicable by definition. Roberto's starting-point was the idea that, although Ricardo's model yielded the result that trade was always in the interest of a country, it actually occurred only if there were absolute advantages in commerce between economic actors which compared the (absolute) prices of a good in the two countries, given a certain exchange rate. In the higher-productivity country, wages were necessarily higher than in the less efficient country, where factor remunerations were defined on the basis of lower levels of productivity and overall output. It was logically likely that productivity gaps would be on average perfectly off-set by wage gaps (calculated in the same currency)—which demonstrated that comparative advantages are also absolute advantages (Camagni 2002; Chap. 5).

Roberto has recently taken up the challenge of identifying sources of productivity gains once again by offering a new and fruitful concept able to summarise all different potential sources of total productivity differentials among regions, and consequently of regional growth differentials: the concept of territorial capital defined as all the local, tangible and intangible, endogenous and exogenous, assets, of public and private nature, that constitute the development potential of an area (Camagni 2008, 2009a, b, c; Chap. 6). Also in this case, Roberto was stimulated by a challenge. This one was raised by the OECD and by DG Regio of the Commission of the European Union, which launched in some of their official documents the concept of 'territorial capital', providing a very fuzzy definition of what it meant: "Each region has a specific 'territorial capital' that is distinct from that of other areas and generates a higher return for specific kinds of investments than for others, since these are better suited to the area and use its assets and potential more

effectively. Territorial development policies (policies with a territorial approach to development) should first and foremost help areas to develop their territorial capital" (European Commission 2005, p. 1). Roberto took up the challenge by providing a measurable definition of territorial capital through a taxonomy built upon two main dimensions (materiality and rivalry), which enabled direct consideration to be made of a wide variety of territorial assets, both tangible and intangible, and of a private, public or mixed nature, and chosen so as to identify the economic nature of each component of territorial capital and, consequently, the laws of accumulation and depreciation of each component. These assets can in fact be physically produced (public and private goods), supplied by history (cultural and natural resources, both implying maintenance and control costs), intentionally produced despite their non-material nature (coordination or governance networks) or unintentionally produced by social interaction undertaken for goals wider than direct production. The proposed taxonomy allowed identification to be made of the specific economic nature of each component, and the consequent accumulation and depreciation processes that accompany the life cycle of each asset. This was an aspect fundamental for defining the appropriate strategies for the use of these resources, ensuring their protection and their valorization in the long run (Camagni 2009a, b, c; Chap. 5). Supported by empirical analyses, Roberto and his research group (Perucca 2013, 2014; Capello et al. 2011a, b) demonstrated that it is not the endowment of single assets that make the difference for regional growth differentials, but the interaction of specific elements that generate their higher efficiency. Econometric analyses showed that the mere existence of knowledge did not explain regional growth trajectories; on the contrary, knowledge played an important role in those European regions characterized by the high endowments of social and relational capital that were fundamental for the exploitation of local knowledge (Capello et al. 2011a, b).

The synthesis of territorial capital allowed Roberto to highlight different conceptual approaches that characterise the rise of regional competitiveness. Without denying the importance of the traditional functional approach—also termed a "positivist and cognitive approach"—which interpreted the reality on the basis of deterministic, mechanical, cause-effect relationships, Roberto embraced a more modern approach which suggested inter-subjective relationships more complex than the deterministic ones. This approach was based on the ways in which economic actors interpret the reality, react to external stimuli, and are capable of synergic and cooperative behaviours. Roberto underlined and actively participated in defining local competitiveness as linked more to trust and a sense of belonging than to a simple endowment of capital; more to creativity than to the pure presence of skilled labour; more to relational capital than to accessibility; more to local identity than to the presence of important elements like quality of life and efficiency of the economic system (Camagni 2009a; Chap. 18).

Roberto launched the territorial capital concept in the conviction that such a rich concept would be of great normative value, especially in a period when regional policies were expected to be conceptualised on the basis of differentiated strategies specific to the local context. As the "Barca Report" of the European Union

suggested, regional policy had to be a place-based policy built on the basis of the specificities and elements of competitiveness of each single area through participatory and inclusive processes (Barca 2009). A conception of territorial capital embracing and systematizing all the elements on which competitiveness could rely—and highlighting the laws of accumulation and depreciation—was therefore crucial for the appropriate design of these policies.

Roberto's scientific interest in the sources of regional competitiveness culminated in the implementation of an innovative and new macroeconometric regional growth forecasting model (called MASST), which was built by his group on all the ideas that Roberto had previously developed on the sources of regional competitiveness: (1) the crucial role of macroeconomic elements and conditions in interpreting regional growth; (2) the importance of local conditions, understood as territorial localised externalities, behind both the propulsive forces of regional growth and local responses to exogenous aggregate trends; (3) the importance of the right mix of asset endowments, and of their interactions, for competitive growth.

The internal logic of the model allowed all crucial macroeconomic aspects and endogenous territorial assets to find a role. The structure of the model was, in fact, an elegant merger of two different approaches: macroeconomic Keynesian growth theory as regards national growth, and the theory of endogenous development as regards the regional growth differential. With this structure, the model allowed endogenous differentiated regional feedbacks of national policies and trends to take place, as well as to be distributed differently among regions, according to each region's capacity to capture national growth potentialities, following a distributive logic. In their turn, regional shocks, and regional feedbacks, propagated regional GDP growth on the basis of structural elements explaining regional capacity to react to shocks. Regional shocks propagated to the national level through the sum of the regional GDP levels, giving the model a generative nature (Capello 2007b; Capello et al. 2008; Capello and Fratesi 2008; Capello et al. 2011a, b, 2014; Camagni and Capello 2012; Chap. 7).

The MASST model now competes with other well-known regional growth models like GMR (Varga 2015), REMI (Treyz 1993) and RHOMOLO (Brandsmaa et al. 2015). However, it remains unique for its capacity to merge macroeconomic factors with territorial, local, endogenous ones (Capello 2009).

Roberto applied the MASST model to develop scenarios. Once again, his originality brought his research group to identify a particular methodology in scenario building, now known as "quantitative foresight". The intention of Roberto's methodology was not to provide precise estimates of future GDP levels (forecasts), but rather to highlight the main tendencies, major adjustments to change, relative behavioural paths that will be at work, given some conditional assumptions about the influence of the main driving forces (conditional foresights). Moreover, the intention was not to identify desirable, positive, ideological or most probable scenarios. Instead, the goal was to combine in a strictly logical way the different trajectories, or different bifurcations, that can be envisaged in the main economic, institutional and social driving forces of change and consequently to

build a small number of alternative, likely, and 'conditional' scenarios. The methodology was as neutral as possible *vis-à-vis* the results, letting the forecasting MASST model produce the outcome associated with a particular set of assumptions about the future. With this scenario-building methodology, the research group produced representations on what the future of the European territory would look like under alternative assumptions concerning: (i) after-crisis territorial development paths (Camagni and Capello 2011, 2012; Camagni et al. 2015); (ii) structural industrial changes in Eastern and Western countries (Capello et al. 2015); (iii) European policy strategies (place-based vs. social cohesion policies; Capello and Caragliu 2016).

1.3.3 On the Role of Territory in Innovation Processes

Roberto's studies on sources of regional competitiveness have always given particular emphasis to innovation processes. Since his first studies on the spatial diffusion of innovation (Camagni 1985; Chap. 3), Roberto has always been attracted by interpretation of the role of territory in innovation diffusion processes and knowledge creation (Camagni 1991a; Chap. 4). Roberto had a clear idea of what he meant by territory: "(i) a system of localised externalities, both pecuniary (where advantages are appropriated through market transactions) and technological (when advantages are exploited by simple proximity to the source); (ii) a system of localised production activities, traditions, skills and know-hows; (iii) a system of localised proximity relationships which constitute a 'capital'—of a social psychological and political nature—in that they enhance the static and dynamic productivity of local factors; (iv) a system of cultural elements and values which attribute sense and meaning to local practices and structures and define local identities; they acquire an economic value whenever they can be transformed into marketable products—goods, services and assets—or they boost the internal capacity to exploit local potentials; (v) a system of rules, practices and institutions defining a local governance model" (Camagni 2002, pp. 2396; Chap. 5).

With this definition of territory in mind, Roberto developed his theories on the role of space in innovation processes and knowledge creation. Attracted by the pioneering work of Torsten Hägerstrand (Hägerstrand 1966), in the mid-1980s Roberto became interested in the spatial diffusion of innovation, and worked on the idea of an S-shaped pattern as the correct representation of an innovation diffusion process over time. Roberto was particularly interested in the main criticism of Hägerstrand's model: that it can explain adoption processes only through a simple epidemic process, where the pure likelihood of contact between people who have already adopted an innovation and its potential adopters is used as an explanation of innovation diffusion. This approach contained the implicit assumption that every potential adopter has the same opportunity to adopt, and that spatial variations in adoption are due solely to information flows that spread territorially at different times. Following the pioneering studies of Griliches (1957) and Mansfield (1961), Roberto found a way to conceptualise and empirically prove the role of

local features in explaining the adoption time, as well as the speed and saturation level, of innovation diffusion processes (Camagni 1985; Chap. 3). In particular, Roberto suggested that three preconditions are necessary for faster technological diffusion to come about: availability of information in the territorial context, depending closely on its receptiveness and endowment with advanced human capital; relative profitability with respect to existing technologies; and low adjustment cost from the old to the new technologies. For a new technology to be adopted, it is not sufficient that it demonstrates economic superiority with respect to existing technologies; it is also necessary that the present values of differential earnings are expected be higher than the costs which have to be met to bring the internal structure of the firm into line. And this last element is also linked to the characteristics of the regional environment (Camagni and Cappellin 1985). This was the period when I met Roberto, and my first degree dissertation was a study on the economic interpretation *à la* Griliches of the spatial diffusion of telecommunications services in the Italian regions (Capello 1988).

Roberto applied the concept of territory also to identify local conditions for the generation of new knowledge. The theoretical interpretation of space as territory had been present since the early inquiries on the backwardness of the Italian *Mezzogiorno* in terms of institutional, political and socio-cultural factors (Nitti 1903; Gramsci 1934). It later opened the way to the huge theoretical advancements of the endogenous development literature—industrial districts, production clusters—through the Italian regional scholars' attention given to intangible, atmosphere-type, local synergy and governance factors (Bagnasco 1977; Becattini 1975; Brusco 1982). Within this stream of thought, Roberto re-interpreted the role of space as the generator of dynamic external economies—that is, all those advantages which favour not only the productive efficiency of firms but also their innovative efficiency. In this perspective, space reduces the uncertainty associated with every innovative process (Camagni 1991a; Chap. 4). Relational capital, defined as a set of proximity relations which brings together and integrates a local production system, a system of actors and representations and an industrial culture, and which generates a localised dynamic process of collective learning, is at the basis of evolutionary processes of local areas, defined as *milieux innovateurs*.

While in the literature of the mid-1970s geographic proximity had already been associated with socio-cultural proximity—the presence of shared patterns of behaviour, mutual trust, common language and representations, common moral and cognitive codes—to explain static advantages for firms, thanks to Roberto and the GREMI group that he co-chaired for more than 15 years, non-spatial proximity became the conceptual tool to interpret dynamic efficiency and endogenous innovation processes (Camagni 1991a; Chap. 3; Camagni and Capello 2002; Camagni and Maillat 2006), opening the way to many studies that later elaborated on the concept of a-spatial proximity to innovation processes (Boschma 2005; Torre and Rallet 2005). On critically examining the value added of the most recent theories in this field, it is striking how Robert's milieu innovateur theory remains an unsurpassed approach, being the only one in which local elements are at the centre

of the sources of local innovative capabilities of local areas through processes of collective learning.

Roberto played an active role in the debate on intangible, social elements behind economic phenomena. It is always the case when new concepts are launched that they risk being over-emphasised; this is what happened in the 1980s to social elements interpreted as facilitators and supporters of economic interactions, to the point that the concept of social capitalism was suggested to interpret an economic system which avoided market competition thanks to the presence of social cohesion, trust, and sense of belonging (Nanetti 1988). Roberto clearly rejected this approach, stating that, despite the impression that might be given by industrial district theory's constant emphasis on cooperation, firms operating in a district engage in aggressive competition with each other, being obliged to do so by the ready substitutability of the goods which they produce.

Roberto's most recent ideas on innovation adoption and knowledge creation were stimulated by the request of the ESPON programme for a description of "the territorial dimension of the knowledge economy in Europe" on which to build sound innovation policies to re-launch the competitiveness of Europe as a whole. In this endeavour, together with his research group, Roberto developed the concept of regional innovation patterns. These were defined as different modes of performing the different phases of the innovation process, built on the presence/absence of the context conditions that support knowledge creation, knowledge attraction, and innovation. Roberto's idea was that the various components of the cognitivist, linear model of innovation—knowledge, invention, ideation, innovation, development—had to be broken down, separated, differently allocated in time and space, and finally recomposed following a relational logic of inter-regional cooperation and exchange. The way in which the various components were recomposed depended once again on the structural features of each regional context; the local conditions—interpreted both as material elements, in the form of functions for the creation of knowledge (R&D laboratories and universities), and non-material ones in the form of the relational capacity of local actors—became in this way integral part of the innovation mode of a region (Camagni and Capello 2013; Capello and Lenzi 2013; Chap. 16).

With the concept of regional innovation patterns, Roberto and his school broke with the traditional idea that the pure existence of knowledge creation functions is sufficient to guarantee the occurrence of an innovation process.[3] Moreover, in Roberto's approach, innovation assumes a *relative* connotation—as a localised novelty in products, in technological or commercial processes, in organisation *with respect to the past*, not with respect to some best practice realised elsewhere—and, interestingly, it does not empirically exhibit a hierarchical sequence among the different patterns in terms of economic outcomes (productivity or GDP increases, innovation density). As we shall see later, this pioneering way to

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[3] I refer here to the project entitled "KIT—Knowledge-Innovation-Territory" for the ESPON 2013 Programme, Luxembourg, 2010–2013.

conceptualise regional innovation was an important input for the design of modern smart innovation policies (Camagni and Capello 2013; Capello and Lenzi 2013; Chap. 16).

1.4 On Urban Economics

1.4.1 On the Five Principles in Urban Economics

During his scientific career, Roberto became fascinated by the phenomenon of the city, its complex nature, structure, evolution, the formation of urban systems and of their dynamics. His interest started after his first years of scientific studies, and it grew rapidly until the moment when he began the major *opus* of his life, the textbook on Urban Economics, published in Italian (1992a), French (Camagni 1996c) and Spanish (Camagni 2005a), and which took 5 years of his life (mostly during his winter and summer holidays) to complete. Thanks to the publication of his textbook, Roberto became the best-known urban economist in Italy, the only one in the country to hold a chair as full professor in urban economics, and his reputation as an urban economist also grew rapidly worldwide.

The uniqueness of Roberto's textbook lays in two main aspects. The first was the structure of the book, which organised the discipline around five main principles, replying to five main questions: the agglomeration principle, related to why a city exists; the accessibility principle, devoted to explanation of how economic and residential activities are organised within a city; the spatial interaction principle, aimed at interpreting the relationships among different parts of the city and among different activities within the city; the urban hierarchy principle, devoted to explanation of the economic laws behind the formation of urban systems; the competitiveness principle, which replies to the question: what are the economic sources of a city's growth? In this logical structure, the reader finds a link between theories and methods of different types (like pure economic models, both neoclassical and Keynesian in nature, spatial interaction models *à la* Wilson, geographic models *à la* Christaller and Lösch) that apparently do not have any shared feature and explanation to justify their existence in the same discipline. In Roberto's book, different theories and models were presented in systematic manner with a common aim: to explain the formation of urban rent. In fact, each of the first five chapters is devoted to provide the reader with the theoretical and interpretative tools to understand a subsequent fascinating chapter concentrated on urban rent (see Sect. 1.4.4 of this introduction).

The second characteristic of the textbook was that it did not only critically present all economic theories and models useful for understanding the city; it also contained new concepts and ideas that Roberto developed while writing the book. Some of them had never been published elsewhere, so that the textbook became a source of inspiration and novelty not only for students but also for scholars and experts of all levels. Being myself the author of a textbook (in my case on regional economics)—a decision I made certainly influenced by the knowledge, reputation

and self-confidence that Roberto acquired from writing his opus—I can confidently claim that Roberto's textbook remains a magnificent scientific work with a unique value.

Roberto's seminal ideas in urban economics were numerous (probably more than in regional economics). They are now briefly presented to guide the reader through the second part of the book.

1.4.2 On Optimal City Size and Agglomeration Economies

From the mid-1970s to the end of the 1980s, urban growth was conceived as dependent on urban size. In that period, a large number of econometric studies measured the importance of size as a source of agglomeration economies (see among others, Carlino 1980; Henderson 1974; Hoch 1972; Shefer 1973; Sweikauskas 1975) with no consideration of the fact that, despite their size, cities continue to grow, raising doubts as to the real existence of an "optimal city size" equal for all cities.

In the mid-1980s, together with two colleagues (Lidia Diappi and Giorgio Leonardi), Roberto entered the debate on the optimal city size by insisting on the importance of economic functions, each characterised by a specific demand threshold and a minimum production size. Starting from this consideration, Roberto and colleagues built a "supply side urban dynamic model", called SOUDY, and showed that there exists a minimum and a maximum city size beyond which urban location diseconomies outweigh the production benefits typical of that function (Camagni et al. 1986, 1994; Camagni and Diappi 1991; Diappi and Pompili 1990; Chap. 10). As each centre grows, approaching the maximum size compatible with its rank ('constrained dynamics'), it enters an instability area where it becomes a potentially suitable location for higher-order functions thanks to the achievement of a critical demand size for them. In dynamic terms, each city's long-term growth possibilities depend on its ability to move to higher urban ranks, developing or attracting new and higher-order functions ('structural dynamics'). This 'jump' is not mechanically attained: it represents a true urban innovation, and it was treated as a stochastic process in the dynamic model. The city could stop growing if it did not innovate, and it could continue to grow if it innovated in the function that it hosted.

By reasoning in this way, the SOUDY model overcame some of the limitations of the 'optimal' city size theory by suggesting:

– the need to replace 'optimal' size with an 'interval' within which the city's size is 'efficient', i.e. where average production benefits exceed average location costs;
– the need to allow for different 'efficient' urban intervals according to the functions actually performed by cities;
– the possibility of separating urban ranks from urban size. Differently from Christaller's approach, two cities of the same size can belong to two different ranks, depending on their capacity to attract/develop higher functions.

Solid econometric analyses by Roberto and his school demonstrated that when urban functions are taken into consideration, urban costs and benefits show a different shape with respect to the optimal city size theory; by increasing value added functions, the benefits of being located in a city (*ceteris paribus*) increase, as the SOUDY model suggested (Capello and Camagni 2000).

More recently, Roberto and his school have once again become theoretically interested in the explanation and empirical validation of the idea that agglomeration economies are not linked merely to the size of the city (Camagni et al. 2013). Criticising the neoclassical simplified approach that cities (like all places of agglomeration) enjoy pecuniary externalities generated by market interaction among firms which individually exploit internal economies of scale when a new firm enters the market (Krugman 1991), Roberto and his school once again highlighted the importance of the territorial characteristics of an area. In the absence of these conditional factors—like specific urban functions and the capacity of the city to cooperate with other cities—cities may experience a halt in their growth path and even a decline irrespective of their size class. These factors are not really quantitative in nature, but rather qualitative, and some quantum jumps in their endowment are needed at specific intervals if agglomeration economies are to fully generate their beneficial effects. The quality of activities hosted, the quality of production factors, the density of external linkages and cooperation networks, the quality of urban infrastructure—in internal and external mobility, in education, in public services—are all enabling factors allowing a long-term 'structural dynamics' process (in the language of dynamic modeling) through what could easily be called a process of urban innovation in each urban category (Camagni et al. 2013).

More recently, together with his school, Roberto has addressed another limitation of the neoclassical approach to agglomeration economies and city size, which claimed the superior efficiency level of larger vs. smaller cities (Krugman 1991 followed by all the new economic geography school); a claim largely contradicted in the real world by the fact that in certain periods of time smaller cities grow more than larger ones.

Roberto and his school suggested that the explanation for this apparent contradiction is the fact that what matters for interpreting urban growth is the crucial distinction between a static and a dynamic definition of urban advantage/productivity. In the former case, a comparison among cities across space, in the absence of a time dimension, highlights the superior efficiency *levels*; in the latter case, a comparison among cities in terms of time performance indicates the possible drivers of efficiency *increases* for each city size, especially in terms of the capacity to change some of the city's internal characteristics which may act as structural constraints on its growth (Camagni et al. 2014, 2016; Chap. 12). Through an empirical econometric analysis on urban growth, Roberto and his group demonstrated for the first time that if urban productivity is linked to the size of cities (larger cities are more productive), this is not the case in dynamic terms: what explains urban dynamics is the increase of high-value functions more than the size of cities (Camagni et al. 2016; Chap. 12).

Again in regard to urban size, Roberto highlighted the limitations of the Von Thünen-Alonso-Fujita neoclassical approach to urban dynamics. In the neoclassical city, location benefits and costs are by definition equal. Roberto's intuition was that this is true in an intra-urban equilibrium logic, according to which, in the Alonso-Fujita model (Alonso 1964; Fujita 1985), the residential and production location equilibrium of, for example, a sub-urban location was achieved via a compensation mechanism between accessibility and urban rent. The result of the model was an indifferent location choice among all possible locations, i.e. lower accessibility to the centre was compensated for by lower rents and higher environmental quality. When the same reasoning was applied at an inter-urban equilibrium—the only possible result was that in an equilibrium solution, the same profits and utility levels had to be guaranteed by each city. In fact, if this were not the case, *ceteris paribus*, a city offering higher rents but lower agglomeration benefits (with the hypothesis of non-existent transport costs) would lose both residents and firms (Camagni 1992a). Urban size was in this case the result of market forces pushing towards the maximisation of utility levels for residents and profits for firms. On this reasoning, however, the use of the same production function for all cities inevitably generated cities of the same size (Camagni 1992a).

1.4.3 On Urban Crisis and Urban Success

With his passion for the city, Roberto could not resist entering the debate on the economic sources of urban crisis and urban success, an issue brought to the attention of scholars by famous economists. One of them was Baumol, whose model (1967) of the anatomy of urban crisis linked to stagnant productivity in services compared with the rise of salaries was well-known. However, this model was criticised because if activities of the stagnant sector influence the growth rate of labour productivity in the progressive sector, the aggregate growth rate of the city may be positive over time in conditions of balanced growth. Hence the "stagnant" sector, and the city, assume a propulsive role rather than the parasitic one emerging from the original model (Cusinato 2007).

Roberto found an original way out of this apparently endless debate by assuming, together with his French colleague and friend Philippe Aydalot, a partially different perspective: that of analysing income distribution between the city and the non-city, i.e. the countryside (Aydalot and Camagni 1986). Starting from the idea that the city cannot be interpreted as a closed system, as in Baumol's model, because it is inherently an element in the social (and spatial) division of labour, the reasoning of urban success and crisis enlarged. If urban services, considered as intermediate goods for industrial production, are able in their trade with the industrial countryside to transfer cost increases into prices, even in the presence of stagnation of total service production in the long run, the real value of these services in terms of agricultural and industrial goods increases. Thanks to a favourable trend in the terms-of-trade between the city and the countryside, the city may benefit from an increase in its income and purchasing power, avoiding its

crisis in spite of the stagnation of its real contribution to total GDP. This was what was meant in Marxian economics by the "contradiction between city and country-side" or in modern terms, by the inflationary nature of the city. Aydalot and Camagni tested three hypotheses: perfect specialization of the two territories and labour mobility (the city grows in size and appropriates the entire GDP in monetary terms); imperfect specialization and labour immobility (the city does not grow in size by definition and postpones its stagnation in time); and comparative advantage of the city in the production of services (the city may exploit this advantage by imposing prices and terms-of-trade even higher than in the previous competitive cases) (Camagni 2009a).

Roberto studied urban crisis and success also from a different perspective, that of the relationship between profits and rents. This was once again a perspective of income distribution, this time between two types of remuneration, a long-standing leitmotif in classical economic thought: land rent appropriates profits in the long term, determining a generalized trend towards a general crisis. In cities, a growth in profits (as a consequence of the launching of a new wave of innovations *à la* Schumpeter) is soon captured by an increase in urban land rent, giving rise to a consequent crisis (in profits, employment and urban income) until rents decrease again. Roberto theorized and modelled this mechanism in a prey/predator dynamic model in which profits were the prey and rents were the predator (Camagni 1992a). The model was successfully estimated in the case of Italian cities by his school (Capello 2002; Capello and Faggian 2002).

Again in his constant endeavour to explain growth dynamics, Roberto elegantly provided a convincing and rich interpretation of the city as a milieu oriented to continuous innovation: an operator which, by virtue not only of geographical but also of cognitive proximity, enhances dynamic efficiency and innovation through the (socialized) reduction of uncertainty and collective learning processes (Camagni 1991a; Camagni et al. 2004; Camagni and Capello 2005; Chap. 11). According to Roberto, even if the city is a much more complex system, pursuing major social goals which are not relevant to the milieu, it shares some characteristics with the latter: elements of proximity, strong internal integration, synergy, and psychological and cultural identity, that feed processes of collective and socialized production and the capacity to develop a common "vision" for the evolution of the local milieu (Camagni 1999). Moreover, the urban milieu is characterised by a network of informal or selected linkages developed around a specialisation sector or filière which grows within the urban context or the urban production system: "Empirical evidence suggests that many cases exist of such milieux or innovative milieux which characteristically exploit an urban atmosphere (and therefore an urban location), without implying that the entire city behaves like a milieu. The cases of the financial milieu in cities like Zurich, Geneva, Frankfurt; the innovative milieux developing around the fashion creation filière in Milan or Paris; the media or the communication milieux in Hamburg and Milan are impor-tant examples" (Camagni and Capello 2002, p. 257; Chap. 11). It is in terms of these intangible, relational aspects that urban competitiveness can be partially explained.

1.4.4   On Urban Rent

As said, the main purpose of the textbook on urban economics written by Roberto was to explain urban rent, even if in Italy this theme had always received little attention, with the exception of two seminal books by Erik Silva (1964) and Italo Magnani (1971), and of some radical reflections by leading urban planners interested more in the management of land rent than its interpretation (Campos-Venuti 1967). Roberto filled this gap in a chapter in his textbook devoted to urban land rent (Camagni 1992a, Chap. 9) and proposed a general theoretical synthesis in which two main subjects were given innovative treatment: the theorization of absolute land rent, and the profits/rent relationship, already mentioned above.

On absolute rent, Roberto started from Marx's intuition, which was not followed by a proper and acceptable theorization. It emerged from some inconsistencies in the standard von Thünen–Alonso model and some insufficient interpretations of the real world, namely (Camagni 2009a):

– why should a landlord on the edge of a city lend its property for a rent equal to zero? (this was mainly Marx's argument);
– what if total demand for urban land suddenly increases?;
– what if a city is able to provide perfect and costless transport modes in all directions so that each place becomes equally and perfectly accessible? Differential rent should go to zero but actual rent would rise because everybody would want to live and work in such a city!

Roberto took up the challenge of answering these questions by conceiving absolute rent as the effect of a generalized, macro-territorial "demand for city", always compared with the scarcity of urban(-ized) land and its slow supply process and determined by the presence of generalized agglomeration advantages. The theoretical consequence was that it is not possible to build a complete theorization of urban rent by working on the accessibility principle alone (and differential advantage); the agglomeration principle providing an "absolute" advantage to all urban sites must be considered and added to the theoretical frame (Camagni 1992a, Chap. 9; Chap. 14).

1.4.5   On Urban Systems

At the beginning of the 1990s, a pioneering idea on "city networks" was launched by the Turin geographical school (Dematteis 1985, 1990; Emanuel and Dematteis 1990), which started to question the hierarchical, mainly vertical, relationships behind the Christaller approach to urban systems, and showed instead the existence of relationships different from the vertical, spatial ones among cities of different rank.

Descriptive rather than interpretative analyses of the phenomenon were provided by the geography school, which stimulated in Roberto's mind the intent to provide a

solid economic explanation for the existence of those horizontal, a-spatial relationships among cities even of the same size that occurred in reality, and which could not find any rational explanation in Christaller's theory.

Inspired by industrial economics in which the concept of network behaviour was studied, Roberto efficiently transferred this concept to urban economics. He interpreted city networks as systems of relationships and flows of a mainly horizontal and non-hierarchical nature among complementary or similar centres; their economic rationale consisted in the provision of externalities or economies of respectively a specialisation/complementarity/spatial division of labour and synergy/cooperation/innovation. In the former case one could speak of "complementarity networks"; in the latter, of "synergy networks" (Camagni 1994; Chap. 10). In practical terms, the networking process came about through transport and logistics integration, cooperation in multiple fields, the single location of high-order functions or facilities without their being replicated on the small scale of the single city, organisational and informational integration (as for example in tourist cities organized into integrated itineraries). The twofold advantage provided by the network was that it enabled achievement of a larger market and critical mass—whereby some excellence functions become profitable—while maintaining the limited, and certainly more sustainable, size of the single centres (Camagni 1994; Chap. 10).

The city network concept recalled that of "borrowed size" propounded by Alonso (1973) to explain a disconnection between the size and function of smaller cities part of a megalopolitan urban complex: '[t]*he concept of a system of cities has many facets, but one of particular interest ... is the concept of borrowed size, whereby a small city or metropolitan area exhibits some of the characteristics of a larger one if it is near other population concentrations*' (Alonso 1973, p. 200). However, the city network concept added to that of "borrowed size" the idea that size can be borrowed not only thanks to physical proximity to larger centres but also thanks to relationships and flows of a mainly horizontal and non-hierarchical nature among complementary or similar centres, located far from each other, intended to achieve network externalities (Camagni 1994; Capello 2000; Camagni and Capello 2004; Chap. 10).

Statistical-econometric analyses conducted by Roberto and his school corroborated the city network paradigm. The first type of empirical analysis allowed city networks to become visible when inter-city interaction (e.g. telephone calls) was far greater than that expected on the basis of an entropy spatial interaction model. This method made it possible to identify city networks in northern Italy in two main cases: in district areas characterized by close interaction and cooperation, and in the metro area of Milan, with an initial polycentric organization (Camagni et al. 1994). The second type of analysis was able to quantitatively measure the existence of network externalities in city networks. An international network of cities, namely the Healthy Cities network, was analyzed with econometric and clustering methodologies in order to identify forms of network externalities or network surplus. Different behavioural styles were found: opportunistic behaviour (only political legitimacy for local policy makers), exploratory

behaviour (with little learning or advantage), efficiency aiming behaviour (through information gathering and cooperation), and strategic behaviour (seeking shared innovative solutions) and a clear network surplus was identified (Capello 2000; Camagni and Capello 2004).

1.4.6   On Urban Sustainability and Urban Form

At the end of the 1990s, a wide-ranging debate began on how cities should grow in terms of physical structure in order to protect the environment. Urban sustainability and urban form became fashionable themes (see, among others, Breheny 1992; Haughton and Hunter 1994), on which planners and urban economists provided interesting ideas, even if the debate was soon taken over by ideological, rather than scientific, reasoning.

Roberto entered the debate by claiming that urban sustainability was "hindered until recently by some unresolved problems—of definition, methodology and epistemology—intrinsic in the more general concept, and also by some specificities of the urban case which have not been sufficiently borne in mind" (Camagni 1998, p. 6; Chap. 13).

Roberto assumed leadership of an extended research programme on urban sustainability developed by economists and planners at the Politecnico of Milano with the aim of defining the fuzzy concept of urban sustainability and specifying its various aspects. Roberto suggested that, given the artificial nature of the city and its historical role of facilitating human interaction, a definition arising from natural contexts was unsuitable, while one based on the co-evolution and positive interaction among the economic, social and physical subsystems seemed more appropriate and fruitful, particularly with reference to the complex environment/growth nexus (Camagni 1998). Sustainable urban development was therefore interpreted by Roberto as a process of synergetic integration and co-evolution among the great subsystems making up a city (economic, social, physical and environmental) which guaranteed the local population a non-decreasing level of well-being in the long term, without compromising the possibilities of development of surrounding areas and thereby contributing to reducing the harmful effects of development in the bio-sphere (Camagni 1998; Camagni et al. 1998; Capello 1998; Chap. 13). Efforts were made to measure urban form by Roberto and his research group, in both theoretical and empirical terms. Roberto's work in 2002 (Camagni et al. 2002) was probably the first econometric analysis in Europe to link urban form with urban sustainability, showing the impact of sprawl and low density settlements on land consumption and mobility by private means and the advantage of compact, diversified and mixed urban tissues.

Testifying to the originality of Roberto's analyses of urban sustainability is the prize that he received from the Fondazione Confalonieri of Milan, in 2008, for "innovative, creative and original studies in the field of urban sustainable development".

1.5   On Regional Policies and Spatial Planning

1.5.1   On Justification, Design and Implementation of Regional Policies

The policy side of scientific research has always been the main scope and interest of Roberto's research activity. His passion for the normative side of his research found practical application when he was appointed Head of the Department of Urban Affairs at the Presidency of the Council of Ministers in Rome, under the Prodi Government, in 1997–1998. Moreover, Roberto found time and energy throughout his scientific career to act as a member of the scientific committees of various local administrations, in Italy and France, and as an expert for international agencies like OECD and DG Regio. It is therefore not by chance that, during his scientific life, Roberto put forward suggestions on policy structure, design and implementation, at regional and urban level, always from an innovative perspective with respect to the existing practices.

In the field of regional policies, Roberto worked on the justification of regional policies, as well as on their efficient design and implementation. During the 1990s, Roberto was concerned with the justification of regional policies when he entered the debate on the advantages and disadvantages of the constitution of a Single Market for lagging regions. Contrary to the general belief of that time, Roberto was convinced that "Objective 1 regions would not only benefit less from the creation of the Single Market, due to their weaker economic structure, but they will also suffer directly from some of the harmonization regulations implied by the 1992 program and from the consequences of the decision to move rapidly towards European Economic and Monetary Union" (Camagni 1992b, pp. 361–362), once again highlighting the importance of regional structural policies. This determination derived from Roberto's (at that time) embryonic idea that regions compete on the basis of absolute advantages (Chap. 5), an aspect in which Roberto found strong justification for structural funds, and for allocating them on the basis of efficiency principles. Within lagging regions, areas exhibiting a greater capacity to evolve, change, and adjust to novelties (the well-known milieu innovateurs) should be prioritized in terms of policy interventions; from their dynamics, development could start and spread to less dynamic areas (Camagni 1992b).

Another idea rooted in Roberto's approach to regional policy was his conviction that macroeconomic policies and trends exert a strong influence on regional growth. In a recent joint work, Roberto and myself argued that, as was the case in the 1992 devaluation of the lira in Italy, also the widening of the spread—the risk premium requested on public bonds with respect to riskless bonds—that hit many European countries during the 2011–2012 crisis period produced asymmetric regional shocks (Camagni and Capello 2015; Chap. 17). On applying the MASST model to forecast regional GDP growth in 2030 in all European regions of the 28 EU countries, a striking result was obtained from a baseline scenario built on the assumption of a "status quo" of the magnitude of intervention and allocation of regional funds: regional disparities would increase even under the assumption that the crisis would

end in late 2016. Roberto used this result once again to justify the importance of the necessity of structural funds in the period of economic downturn to counteract the increase in regional disparities caused by the recession period.

The above-mentioned 1992 work on regional policies contained some embryonic ideas on regional policy design and implementation, the most important one being that of the need to overcome the traditional efficiency vs. equity trade-off, Roberto relaunched and reinforced this idea when a robust scientific debate took place on the necessary "paradigm shift" of cohesion policies from a mainly redistributive logic, typical of the last century's approach, to a development logic (OECD 2001; Bachtler and Yuill 2001) which called for endogenous development, continuous innovation, and a growth perspective.

The modern logic was accompanied by two opposite policy philosophies concerning its implementation. On the one hand, a more market-driven and institutional approach was proposed by two influential Reports (Sapir 2003; World Bank 2009; Gill 2011) which pointed out the superior efficiency of large metropolitan areas and the need to support them for the sake of aggregate well-being. On the other hand, a "place-based" regional policy philosophy was developed, under the influence of the OECD and the Barca report (Barca 2009), which based regional policies on place specificities and territorial assets. In a recent work, Roberto and myself have elaborated on these two opposite views by claiming that "what could be more productive in conceptual terms is demonstration that the long-standing supposed trade-off between 'efficiency and equity' or, in more recent terms, between competitiveness and cohesion goals, may be overcome and prove non-existent insofar as a renewed cohesion policy—addressing the development potential of almost all 'places' with new awareness and a new institutional sensitivity—could claim to achieve both goals at the same time" (Camagni and Capello 2015, p. 27; Chap. 17).

A recent regional policy debate at European level has focused on the innovation policy strategies most appropriate to help Europe overcome its knowledge creation gap with respect to the most dynamic, advanced and emerging, countries. Also in this field, Roberto could not be absent, and thanks to a large research project financed by ESPON (European Spatial Observation Network)[4], he proposed a thorough interpretation of innovation policies that enriched the one proposed by the smart specialization strategy, the new regional innovation policy framework suggested at European level (Foray 2009, 2014; McCann and Ortega-Argilés 2014). According to Roberto, the recognition of the existence of different patterns of innovation for each region, developed by his school, paved the way towards a renewed, spatially sound inclusion of the smart specialization strategy into an appropriate regional innovation policy framework, along lines similar to the reform of the EU regional development funds (EC 2010). On the basis of regional innovation patterns, in fact, Roberto elaborated what he termed smart innovation

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[4]I refer here to the above-mentioned "KIT—Knowledge-Innovation-Territory" project for ESPON 2013 Programme, Luxembourg, 2010.

policies, i.e. "those policies able to increase the innovation capability of an area by boosting effectiveness of accumulated knowledge, fostering new applications and diversification, enlarging and deepening the local knowledge base, starting from local specificities and the established innovation patterns in each region" (Camagni and Capello 2013, p. 357; Chap. 16).

While projects can easily emerge from a bottom-up approach, the general strategy of each region cannot be left to single administrative entities; rather, it has to be built according to the "type of innovative pattern" which characterizes a local economy. The advantage of this method is that it limits the risk of local lobbies and private interests pushing the strategy far away from social interests, and from the real needs of the region.

Roberto elaborated further on innovation policies. He was inspired by the recently developed hermeneutic approach (Cusinato and Philippopoulos-Mihalopoulos 2016), which "explores the sources of creativity and knowledge in depth, and it adds a symbolic and emotional dimension which links together places ('landscapes') and local collectivities, physical contexts and economic actors in a single process of knowledge creation" (Camagni 2016, p. 354; Chap. 18). In this regard Roberto analysed the conditions for renewed policy based "not just on traditional functional elements (human capital, externalities, or external linkages, although these maintain their importance), but mainly on symbolic and cognitive elements (codes, representations, languages, values) replicating the ways in which individuals, groups and communities fully develop their creative potential through synergy, associative thinking, interaction and cooperation in meaningful and recognized places" (Camagni 2016, p. 354; Chap. 16). In particular, "the process of policy design should have been inclusive, being based on the empowerment of a floor, as wide as possible, of local stakeholders, institutions, associations and individuals. Citizens' participation in urban decision-making seemed crucial: diffused imagination and grass-roots experience can be more easily given voice and translated into actual projects (Camagni 2007, 2011). Urban strategic planning could also gain creativity and robustness when it abandons the old-fashioned corporate-like procedures typical of the 1990s and acquires an inclusive character by promoting citizens' participation and public/private partnership (Healey 2001)" (Camagni 2016, p. 352; Chap. 16).

On reading this work, the interpretative power of Roberto's mind is clearly apparent. The most theoretical, conceptual and abstract approach, at first glance totally detached from the reality, assumes a practical usefulness, fascinating the reader with the normative consequences reached.

1.5.2 On Spatial Planning and Territorial Cohesion

Roberto's passion for the interpretation of spatial phenomena induced him to examine the most efficient design and implementation strategies in the field of spatial planning.

During the 1990s, under the influence of his wife Maria Cristina Gibelli, a professor of urban planning, Roberto became interested in strategic planning, and

started to work on it with his wife. They produced papers able to clarify the distinction between traditional, top-down, planning tools and the new strategic planning one, without neglecting some of its limitations, and suggesting how the correct design and implementation of strategic planning should yield the highest returns from its implementation (Camagni 1996a; Gibelli 1996). Roberto claimed that the new urban planning tools—based on negotiation between public and private actors, and transferable development rights—indubitably made it possible to deal with many problems that the previous regulatory planning tradition had failed to resolve. But by themselves the new tools were certainly not able to acquire additional resources. In fact, the full achievement of fiscal objectives depended on their implementation, on the political will in their regard, and on the determination to pursue public interests while ensuring a fair level of profitability for entrepreneurial initiative and rewards for private innovative capacity and strategic design. None of these were elements intrinsic to the new urban planning tools. The objectives of planning equity and efficacy could be achieved in practice through substantial innovations in administrative transparency and in the accountability of administrations to the community (Camagni 2003; Chap. 19).

Enlarging the field of urban planning to the spatial one, Roberto developed a research programme covering more than two decades, during which he started from a clear and measurable definition of what he thought should be the modern aims of spatial planning. Roberto's seminal idea in the field of spatial planning sprang from his consideration that the main goal of spatial planning should be indicated in "the achievement of territorial sustainability and that this goal defines the general and prospective role of spatial planning in a modern and aware society: spatial planning represents the appropriate institutional, technical and policy context for managing the territorial dimension of sustainability" (Camagni 2003, p. 25; Chap. 19). In fact, among the various dimensions of sustainable development—the technological, the behavioural (linked to life-styles in affluent societies) and the diplomatic one (referring to the international strategies to assure cooperation among countries at different development levels, with different development expectations)—Roberto highlighted a new one, the territorial dimension, referring to an ordered, resource-efficient and environmental-friendly spatial distribution of human activities.

With a strong rationality and logic, Roberto highlighted the bi-directional logical relationship between spatial planning and urban sustainability. Sustainability provided the general goal for spatial planning, while spatial planning provided the major institutional context and effective policy tools with which to attain territorial sustainability, thus strengthening the concept and allowing it to be translated into an effective action. The multisectoral nature of both elements was at the basis of this strong relationship; Roberto claimed that "sustainability derives from a positive, synergetic co-evolution of the economic, social, environmental and cultural dimensions of the society. On the other hand, spatial planning finds its *raison d'être* in the necessary integration of the different policy tools which have an impact on the territory" (Camagni 2003, p. 25; Chap. 19).

With these conceptual ideas in mind, when a fuzzy concept of territorial cohesion was launched in the policy field, and the engagement of European research and

institutions in the new field of Territorial Impact Assessment (TIA) (CMSP 1999; European Commission 2004) was required, Roberto was ready to take up the challenge by providing a definition of territorial cohesion on the basis of modern and advanced policy goals of spatial planning (Camagni 2006, 2009c; Chap. 20), on which to base a methodological tool for a territorial impact assessment. Resuming his seminal ideas on sustainability (Camagni 1998; Chap. 13), Roberto interpreted territorial cohesion as the territorial dimension of sustainability, with a positive and a normative connotation at the same time (i.e. it defines a condition and a policy goal). Territorial cohesion operates by integrating different dimensions: economic, social, and environmental (Camagni 2005b), with three main goals to achieve, namely (Camagni 2006, p. 139; Chap. 20): (i) territorial efficiency, interpreted as resource-efficiency with respect to energy, land and natural resources; competitiveness of the economic system and attractiveness of the local territory; internal and external accessibility; (ii) territorial quality, i.e. the quality of the living and working environment; comparable living standards across territories; similar access to services of general interest and to knowledge; (iii) territorial identity, defined as the presence of "social capital"; ability to develop shared visions of the future; local know-how and specificities, productive "vocations" and competitive advantage of each territory. Roberto elaborated on the idea that these three objectives can be achieved only through an integrated approach which ensures the virtuous integration and positive co-evolution of the three main territorial sub-systems—economic, social, and physical-natural—in their spatial manifestation or phenomenology, an idea that was already present, in embryonic form, in his urban sustainability definition.

Building the concept further, by directing two ESPON research projects on TIA[5], Roberto developed an operational model (the TEQUILA—SIP model) able to assess the impact of programmes and projects on the different components of territorial cohesion (Camagni 2006; Chap. 20), which is still the only quantitative tool with which to assess the impact of programmes and projects on territorial cohesion.

1.6 Towards a Conclusion: A Life Spent in Search of the Unknown

Writing this introduction on Roberto's seminal ideas made me once again aware of the richness of his work, but not only this. Before I began writing, I was worried about the difficulty of producing a coherent piece of scientific work, and not just a patchwork of ideas developed in more than 40 years of scientific life. I was impressed by the ease with which I could find a *fil rouge* in the development of

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[5]I refer here to the ESPON projects "Territorial Impact Assessment of Transport and Agricultural Policies–TIPTAP", 2008–2009 and "ARTS-Assessment of Regional and Territorial Sensitivity to EU Policies", 2010.

Roberto's ideas over years of serious and constant work developed with passion, dedication and true intellectual curiosity, building through time a rich, innovative and attractive research programme.

I am convinced that Roberto is a unique example for young scholars, who in modern times are sometimes more attracted by fashionable theories and models. They often take an a-critical approach just to be accepted in fashionable scientific communities. They sacrifice their own interests or, even worse, they are convinced that being followers of fashionable and well-known ideas is more of interest than being pioneers in new fields.

Roberto has always been a pioneer in whatever field attracted his interest. He assumed all the risks of this behaviour. I still remember how difficult the publication of his "city network" theory was. It was rejected by colleagues editing international collected volumes, at that time the most prestigious scientific channel through which to publish. He did not get depressed, however, and waited until an open-minded scientist like Peter Nijkamp understood the richness of his contribution and published it. The reward for his pioneering behaviour was high personal satisfaction in moving the knowledge frontier in regional and urban economics forward, and in being a free mind in search of solid scientific explanations and tools to satisfy his hunger for novelty.

The international regional science scientific community, both students and scholars, all institutions dealing with territorial issues at all levels—European, national and local—and the discipline itself owe a great deal to Roberto. He devoted a great deal of time and passion to the international regional science community. He guaranteed the necessary creation and prosperous development of important associations. He was one of the founding fathers of the Italian section of the Regional Science Association International (AISRe) in the early 1980s, and he was President of the European Regional Science Association in a period of radical institutional change of that association begniing of the 2002. Together with his friend Antoine Bailly, at that time President of the Regional Science Association International, he supported the introduction of the universal membership rule, moving decisively towards a more inclusive membership system, and greatly enlarging the international community.

However, I am convinced that I am the person who owes Roberto the most. On many occasions I have thought how lucky I was to meet Roberto. He was not only my scientific guide; through his behaviour, he taught me to follow my interests, my instinct, my research plans, to bring my own ideas forward despite the difficulties, to face challenges that at a first glance seemed impossible (like writing a textbook!), to believe that what is worked on seriously always has a value, and to understand that working in a team and building a "school of thought" are the main goals for an academic. He taught me especially that all this has to be achieved with happiness, dedication, passion, and a high quality of life—the ingredients necessary for the development of an intriguing and long-lasting research programme. Thanks Roberto!

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Part I

On Regional Economics

From the Role of Space in Knowledge Creation to Scenario Building Through Territorial Capital

Juan R. Cuadrado-Roura

2.1 Introduction

In every branch of science, there have been and continue to be professionals whose analytical and creative ability pushes the boundaries of the knowledge available to us. Roberto Camagni is without any doubt one of those professionals. As this book is pointing out, his work has allowed for advances in three areas of Regional and Urban Economics: regional analysis per se; urban theory; and the contribution of new criteria in the field of regional and urban policy.

I believe there are two conditions that tend to coincide to advance scientific knowledge in any field. The first, unarguably, is to have both a great curiosity and a strong capacity for creation. The second is to apply patient dedication and unwavering effort throughout one's research and professional life. I am utterly convinced that Roberto Camagni fulfils both characteristics, and that it is just that—curiosity, creativity and hard work—which has allowed him to make contributions over more than four decades that have been, and will continue to be, a point of reference for any student of regional and urban issues.

In Roberto Camagni, the traits I describe above are accompanied by two virtues I personally value very highly: humility and generosity. Roberto has never been an self-satisfied man; he never does behave like an important person. On the contrary; on the numerous occasions that I have had the pleasure of his company at a broad range of academic events, conferences and debates, it has always been clear that his great intelligence is coupled with great modesty, with no hint of arrogance in either form or substance. Like the good Italian and Mediterranean people, Roberto is also a warm man. He is open, generous with his time and his dedication to all those who have approached him, and has a high sense of humour and of sarcasm (that "highest form of wit"). In short, Roberto is one of those people with whom one feels instantly

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at ease, and it does not take long to realise that to enjoy his friendship is really a very great privilege.

For all these reasons, I was deeply honoured by and eager to accept the invitation to participate in this book in honour of the contributions made to Regional Economics by Roberto Camagni, which, as I have said, is one of the three broad fields to which he has applied his constant dedication. It was no easy task to select a limited number of works that would be sufficiently representative of his contributions; the five eventually chosen are a clearly limited sample of a much more extensive and richer body scientific research.

However, I do not feel that the papers included in this section of the book broadly cover the main lines of work to which Roberto has dedicated a substantial part of his research and reflections within the field of Regional Economics: Innovation, and how and why it emerges and is diffused; territorial competitiveness; a development of the concept of Territorial Capital, which has always been dear to him; and a methodology to generate forecasts and projections in terms of the European regional landscape. The works on which I shall comment provide a highly innovative view on these four lines of research and my goal will be to highlight the elements which, in my opinion, lie at the core of each of them and how each has contributed to advancing studies in Regional Economy.

Before undertaking this analysis, I feel it is important to highlight a characteristic that has always been salient in Roberto's work. Not only in the texts on which I plan to comment, but in the vast majority of his work. Roberto almost never limits himself to developing purely theoretical or abstract concepts and aspects. We share an approach that leads us not only to seek to 'explain' the trends and processes observed in reality via a theoretical, formal approach, but also to seek to contribute to "bettering our environment". In other words, whilst recognising the importance of speculation and theoretical developments, his contributions always highlight ways in which the work could be applied to improve reality, to offer keys to potential political actions, to deduce outcomes from any rigorous analytical approach that seek to address problems and shortcomings that exist in the real world. This is an approach which, as I have mentioned, I share myself, and which is also favoured by many learned economists, including Alfred Marshall, Gunnar Myrdal, Arthur C. Pigou, William S. Jevons and Adam Smith himself. It is also in line with Alfred Marshall's motivation to study Economics, as cited by Nobel Prize winner Ronald H. Coase (1994, p. 171):

> Marshall himself had come to Economics because he wanted to help eliminating poverty and in enhancing the quality of man and man's life. The economic system which Marshall studies always had this concrete character—it was a system which, leaving the study or the library, one could observe. And for Marshall it was important that one should get it right since it was this real system that one had to explain.

Roberto seeks invariably to ensure that his contributions are *applicable to reality*, both to *understand* the reality but even more so, to *improve* it. It is an approach that some economists do not share, or which they do not believe to be

important, but one which many of us feel should form a guideline for scientists in the field of social sciences, including Economics of course. It is well known that the potential inclusion of proposals and recommendations into theoretical research has been criticised by many economists on the basis of scientific "orthodoxy", which rests, among others, upon Hume's arguments and the demands of positivism. There are, of course, many others who do not share this position. Coase himself (1994, p. 47) was clearly opposed to this "orthodox" position:

> I know, of course, that there are some economists who argue that Economics is a positive science and that all we can do is to explain the consequences that follow from various economic policies... Such self-restraint is I think unnecessary. We share (at least in the West) a very similar set of values, and there is a little reason to suppose that the value judgments of economists are particularly eccentric.

Roberto has always worked and continue to work within the realms of orthodoxy in his development of theoretical concepts and approaches to regional and urban economics. However, as I shall note accordingly, that does not stop him from contrasting his ideas or suggesting criteria and objectives in terms of the policies that may apply in each case.

2.2   From Innovation and the Process of Spatial Diffusion to a Dynamic Theory of Economic Space

The first two texts covered in this part of the book are, in my view, closely linked. The first was published in 1985 ("Spatial Diffusion of Pervasive Process Innovation") and the second in 1991 ("Technological change, uncertainty and innovation networks: towards a dynamic theory of economic space"). The *leitmotiv* in both cases lies in understanding how technological innovation comes about, in what context or environment it is most likely to arise and how that leads to a need to look at territory from a dynamic perspective.

Innovation, technological change and the mechanisms for their diffusion are among the key axes around which Roberto Camagni has focused his attention for several decades, and this is unquestionably an important topic for the understanding of regional development and the disparities in growth observed between different regions. The 1985 text is a seminal work. In Roberto's own words, "the introduction of the spatial dimension in the analysis of the innovation diffusion is not just a further dimension to an already complex problem, but it also plays a part in highlighting a number of fundamental genetic aspects of actual diffusion processes". I believe that the essential contribution of his approach to the topic lies in the development he proposed of the innovation diffusion process. Roberto offers a serious, original, theoretical, formal approach to the nature of diffusion processes that can be summarised as an envelope of two processes defined by the values of some parameters. It does not imply the ex-ante quantitative definition of an initial

asymptote and allows for the possibility of a non-symmetrical process in both the initial and the final phases.

Having developed the theoretical, formal part of the analysis, Roberto—with his ever-present desire to offer a pedagogical perspective—highlights some of the ideas most closely applicable to the corporate world and the companies decisions. He points out that for the individual firm; the adoption process (of innovation) is based on the phases and preconditions shown in a synthetic figure: the possibility of access to information; the estimation of profitability; and the evaluation of adjustment costs. He immediately goes on to add something that had clearly been overlooked: the spatial element is not neutral with respect to each of these phases because it determines the general *technological climate* and the market for those factors which have the greatest influence on the profitability of an innovation.

This consideration of the role of the territory is crucial. It can be accepted that in advanced economies, there is a certain spatial (or regional) homogeneity in terms of access to information. However, this is neither completely true nor completely acceptable. The economic "environment" in which companies operate not only requires analysis, but should also be explicitly taken into account, as it impacts innovation-related possibilities and decisions within companies. If one thing is clear, it is the fact that central regions are distinctly differentiated from peripheral regions in terms of the environment afforded to companies located within said regions, and this observation allows the author to look more closely still at the elements that comprise this "environment" and their influence on technology and innovation diffusion, and on decision-making processes.

To evidence the validity of his approach, Roberto included in the work under discussion a case study on the diffusion of industrial robotics in Italy. This analysis reveals extremely interesting, illustrative results. It becomes clear, for example, that the diffusion of robotics as a process of innovation shows a pattern which is fairly conservative. Starting from central regional nodes, it moved along the top branches of Northern Italy's urban hierarchy and eventually reached the intermediate and peripheral regions through proximity or the decision-making channels of multiregional firms. In essence, the analysis reveals that advances in robotics are concentrated in the northern regions of the country, which are richer and have a more dynamic industrial sector. The periphery lags behind, with certain exceptions stemming from contacts with and/or links to companies in Turin and Piedmont, as well as Lombardy.

A number of years later, Roberto made his mark on a fairly simple idea put forward by Philippe Aydalot: the concept of *milieux innovateurs*, which allowed for in-depth analysis of why and how a climate develops in certain territories which promotes innovation and the adoption of new technologies. This led to an extensive series of contributions by Roberto and by a substantial number of other researchers, eventually including myself, which fuelled the debates of the GREMI (Groupe de Recherche Européen sur les Milieux Innovateurs) (Camagni and Maillat 2006). Nonetheless, the text published by Roberto in 1991, which is the second text selected for this section, anticipates and advances a series of idée-forces that underscore the author's capacity for analysis.

Roberto Camagni pointed out back in 1991 that not only did the traditional, neoclassical theory not allow for an adequate explanation of how innovation is produced, but that it also failed to explain where it arises and how it is diffused. He goes on to cite the need to take into account the factors of market imperfection and uncertainty and incorporate the very nature of the Schumpeterian creative innovation processes, in contrast with the assumptions and deductions—without the time or the space factor—of the neoclassic model. If one accepts this approach, technological change can be interpreted and 'stylised' as follows: (a) it is irreversible; (b) it lies on a cumulative learning process; (c) it implies search and decision routines; (d) it implies the full commitment of all functions of the firm; (e) due to its dependence on internal learning processes it cumulatively builds on tacit, firm specific know-how and on intangible assets; and (f) its historical path may by no means be interpreted in terms of optimality. The learning processes may act as dynamic 'entry-barriers' with respect to possible, possibly more efficient, alternative technologies.

This approach gives rise to an analysis of the relationship between innovation processes and uncertainty. Roberto Camagni develops this topic with brilliance and a strong sense of pedagogy, which leads him to link sources of uncertainty with types of uncertainty (static and dynamic), as well as with the traditional instruments for coping with uncertainty, the outcomes and the new 'operators', which is where the local environment, or 'milieu', emerges as a key factor. This environment tends to reduce the degree of uncertainty at firms and in decisions related to the adoption of innovations and new technology.

Essentially, Roberto offers a far more in-depth view of *milieux innovateurs* than was offered upon the idea's origins, which was softer and more conceptual in nature. Roberto breaks down why these 'milieux' allow firms, through a collective, socialised process, to reduce costs and enhance decision-making processes at local firms. The reasons pointed out by Camagni at the time were: (1) a collective information-gathering through informal interchange of information between firms operating in the same markets, signalling of success decisions on markets and technologies; (2) a function of signalling in terms of product image and reputation, cooperative advertising and supply of a sort of 'quality certification'; (3) a collective learning process, mainly through skilled manpower mobility in the local/ regional area; a collective process of definition of managerial styles and decision routines; an informal process of decision coordination, through interpersonal linkages, easier and faster information circulation on innovative decision-making, easier financial-industrial linkages, similar cultural background of decision-makers.

The foregoing underscores the idea that 'proximity' is an important factor, whether it be through the human resources available, through the enactment of informal contacts or through the synergy effects stemming from a common cultural, psychological and often political background. All of these elements of 'proximity' *fall within the territory,* which allows for an explanation of why innovation creation and diffusion is linked to specific spaces, particularly large metropolitan areas and 'industrial districts', 'valleys' and 'corridors'. The 'milieux' thesis therefore offers a far better explanation of success than other concepts that have been studied in

regional analysis. What is clear is that the reduction of uncertainty is an intrinsic factor in innovation processes and the diffusion of new advances in terms of technology, management and forays into new markets. Roberto extols the virtues of cooperation—formal or informal—as opposed to competition in territories, and draws two highly pertinent conclusions: firstly, that technological progress means, above all, a reduction in uncertainty, and secondly that, in that respect, there are two key 'operators': the local 'milieu' and the 'cooperation space', as well as the possibility of trans-territorial network linkages between firms.

To some, Roberto Camagni's statements might seem excessively informal or merely conceptual, but the fact is that his contributions have opened the door to a more robust, highly territorial understanding of innovation, as well as to the role of networks and to the key role of the local factors present in a certain *milieu*.

2.3   Territorial Competitiveness: A Recurring Topic in Camagni's Bibliography

One of Roberto Camagni's truly important works is, without a doubt, the article published in 2002 in *Urban Studies,* entitled "On the concept of Competitiveness: Sound or Misleading?". It is essentially a theoretical text which is highly robust and needs to be re-read several times to extract the fundamental contribution(s) of its content. It is by no means an isolated piece, as this has been a recurring theme in Roberto's extensive bibliography, but it is a particularly noteworthy landmark.

The argument put forward by Roberto is that the concept of territorial competitiveness is theoretically sound, considering not only the role that the territory plays in providing competitive 'environments' to individual firms, but especially the role it plays in the process of knowledge accumulation and in the development of interpretative codes, models of cooperation and decisions on which the innovative progress of local companies is based. It is therefore clear that in terms of its general arguments, the article does not differ greatly from the two discussed above; rather, it links in very well with them, although its focus is the idea of competitiveness and the need to introduce the role of territory. Camagni also underscores, reiterating his own observations in 1991, as well as those of Capello (1999) and Keeble and Wilkinson (1999), that these processes result in a 'socialised' growth of knowledge, which is embedded not only in the internal culture of companies, individually considered, but in the local labour market or in the 'local industrial atmosphere'.

In short, the paper at hand explores the role of territory in terms of how it offers tools or instruments for competitiveness which benefit individual firms, and demonstrates a clear conviction that, in the phase of globalisation that was already underway at that time, the issue of territorial competitiveness was of critical importance for regional development policies, even though the focus of the paper is essentially theoretical. In the article, Roberto Camagni looks at the Ricardian theory of comparative advantage, which does not appear to apply at the sub-national level. This theory assigns a role to every country in the international division of labour, whatever may be the level of efficiency and competitiveness of

its productive sectors. Roberto argues that the principle governing production, specialisation and trade is a principle of *absolute advantage*. This argument leads him to study the relationships between globalisation and localisation, or better still, local differentiation, where he highlights two possible extremes: on the one hand, the pessimistic position, merging (sometimes adding up) different and disparate concerns from the survival of local cultures to the fear about the economic and political power of multinational corporations; and on the other, the optimistic position, which says that there is no cause for concern because open markets have sufficient self-adjusting mechanisms to ensure local wellbeing and that the law of comparative advantage will assure each country a role in the international division of labour, regardless of what its international competitiveness may be.

Roberto Camagni puts forth a series of ideas which it is difficult to summarise here. It should be noted that he does not fully accept Krugman's ideas on the specialisation of trade, the relevance of imports to exports and static economies of scale (developing his arguments with enviable clarity). His criticism is stronger still when we move from countries—which are always Krugman's focus—to regions. In fact, Roberto goes as far as to uphold that, in his opinion, the law of comparative advantage does not hold in case of confrontation among local economies (inter-regional trade) and consequently the conclusion that each region will always be granted some specialisation and role in the interregional division of labour *is not valid*. An important statement indeed and an original one in the case of Regional Economics, which is based on the analysis of events at the intra-national or territorial level, rather than considering the country as a whole as the unit of reference. Establishing this starting point allows and invites a study of the *sources of regional competitiveness*, a topic which Roberto Camagni had already researched in several preceding works, referenced in the work under discussion here.

To my mind, the article is one of the most important, solid contributions Roberto has made to Regional Economics. It is an analysis that should be re-read now, because it continues to be a key reference. Ultimately, Roberto shows, in his own words, that "differently from the case of countries, cities and regions compete, on the international market, for goods and production factors, on the basis of an *absolute advantage principle,* and not of a *comparative* advantage principle. And this means that no efficient, automatic mechanism may grant each territory some role in the international division of labour, whatever its relative performance". This leads him to argue that weak and lagging territories in terms of competitiveness of economic fabric, accessibility, quality of human and environmental factors, internal synergies and learning capabilities, risk exclusion and decline to a larger extent than in the past.

2.4   A Development of the Concept of Territorial Capital

Roberto Camagni's engaging study entitled "Regional Competitiveness: Towards a Concept of Territorial Capital" was originally included as a chapter of a collective book produced in 2008 by R. Capello, R. Camagni himself and other members of the team formed under their guidance at the Politecnico di Milano. The book was published by Springer (2008) under the title: '*Modelling regional scenarios for the enlarged Europe'*.

It is not, of course, just a chapter in a book. It is a well-crafted, ground-breaking piece of work. Not because the ideas Roberto sets forth are completely new; the concept of 'Territorial Capital' had already debuted in other publications, such as the OECD's *Territorial Outlook* in 1991, as well as articles by other authors and documents by the European Commission's DG Regio in 2005. However, none of those references offered such an in-depth analysis of the concept, its importance and its capacity to explain interregional development and disparities as Roberto's article did.

There was a good reason why this should be so. Roberto Camagni had had the opportunity to reflect on the topic in debates and developments around *milieux innovateurs* and other comparable categories of endogenous development. He was therefore obliged to pay attention to the intangible, atmosphere-type, local synergy and governance factors. Several years earlier, this had led Roberto Camagni himself and other authors (Putman, Camagni and Capello, Foray and Storper) to turn their attention to concepts such as social capital, relational capital, and finally territorial capital.

The concept may sound opaque or vague at best, but Roberto takes great pains to clarify it and ensure it is considered as a key factor in territorial analysis. "Territorial capital", then, is the sum of a series of components:

–   A system of localised externalities, both pecuniary and technological
–   A system of localised production activities, traditions, skills and know-hows
–   A system of localised proximity relationships which constitute a capital (social, psychological and political) in that they enhance the static and dynamic productivity of local factors
–   A system of cultural elements and values which attribute sense and meaning to local practices and structures
–   A system of rules and practices defining a local governance model

Based on these components, Roberto proposes a possible theoretical taxonomy of "territorial capital" based on two dimensions: rivalry and materiality—which I don't have space to analyse more closely here. This allow him to construct diagrams of the traditional and innovative factors of territorial capital, including public resources and goods, private capital, social capital, relational capital, human capital, economies of agglomeration and connectivity (both internal and to other territories), cooperation networks and relational private services. Roberto Camagni's table of territorial capital (Table 6.1 in Chap. 6) offers a great deal of

clarity and is unquestionably one of Roberto Camagni's contributions to elucidating the components of territorial capital. In my view, it includes two key ideas: mixed goods and intangible goods, which in recent years have begun to attract substantial attention from researchers.

It is a shame, perhaps, that Roberto did not—to my knowledge—resume the empirical analysis of the components of territorial capital and the highly important segment of intangibles in particular. Because what truly sets this text apart is its capacity to organise and structure various concepts and factors, some of which had previously been explored separately when in fact they are closely linked.

In any case, there is no question that the analytical and forecasting model produced by the team at the Politecnico di Milano under the guidance of Roberta Capello and Roberto Camagni (the MASST model) benefited from this conceptual clarification of territorial capital undertaken by Roberto Camagni (Capello et al. 2008).

2.5   Incorporating 'Scenarios' into Medium to Long-Term Regional Analyses and Forecasts

The final study selected for this part of the book ("After-crisis scenarios for the European regions") is by Roberto Camagni and Roberta Capello, and was published in 2012 in *Studies in Regional Science*. In the words of its authors, the main objective of the paper is to build after-the-crisis scenarios for European regions, using both qualitative reflections and the 'quantitative foresight' methodology created by the team based on the MASST regional econometric model. However, the contribution of the piece stems more directly from the reflections and the content of a project undertaken through the ESPON 2013 Programme, entitled *'SPAN-3: Spatial scenarios – new tools for regional and local territories'*, which couples qualitative reflections with quantitative approaches based on the aforementioned econometric model.

The scenarios technique is well-known, though various approaches exist. Perhaps the differentiating factor here is that the methodology used is neither pure forecast nor pure foresight. The key is that an image of the future is constructed considering that a discontinuity will emerge (which lies in the structural breaks provoked by the crisis) and exploring the perception that economic agents and governments will have of such a break and its consequences. On that basis, three scenarios are outlined: (a) the *reference scenario,* based on the assumption that the structural changes caused by the crisis will be perceived, but that policies will not be aimed in a direction that allows them to be effective; (b) the *pro-active scenario,* in which the changes are perceived and taken into account and even anticipated by economic agents; and (c) the *reactive or defensive scenario,* in which the changes are not clearly perceived by economic agents and a defensive stance is adopted aimed at protecting existing structures, sectors and businesses. To a certain extent, the latter scenario would afford continuity with the past, ignoring or placing limited importance on the implications of the crisis.

It would make no sense for me to delve deeper into the construction of each of the scenarios, which are based on certain general driving forces—globalisation, technological changes, demography, settlement structure, energy and oil prices—which those who are unfamiliar with the work can find extensively detailed in the paper itself.

Based on my understanding of the work, the effort involved in constructing these scenarios and in taking into account and integrating the conducts and interrelations of the driving forces and the more quantitative estimates, has given rise to a set of robust, coherent results. The methodology is richer, of course, than one which might derive from a relatively sophisticated econometric model. Nobel prize winner Maurice Allais, whose dedication to quantitative economic analysis is well-known, criticised the work of economists who confuse analysis with a technical approach, or with simple methodological formalism, going as far as to say that "for almost 45 years, contemporary economic literature had developed too often in a totally erroneous direction with the construction of complexity artificial mathematical models detached from reality; and too often it is dominated more and more by mathematical formalism which fundamentally represents an immense regression" (Allais 1992, p. 34).

I do not know whether Roberta Capello or Roberto Camagni have read the highly interesting text by Allais on his understanding of economics, which includes other statements in keeping with the quote highlighted above. But I am certain that they both share the view—and the paper under discussion clearly evidences this—that when undertaking forecasts or projections, in this case on the performance of European regions post-crisis, it is absolutely vital to use both quantitative models and more qualitative approaches which not only take into account the main driving forces, but also how these driving forces and their consequences are perceived by economic agents and what alternative scenarios may exist.

2.6   A Final Remark

To accept the challenge of commenting on Roberto Camagni's contributions to Regional Economics naturally involved certain risks. The main one, perhaps, was the risk that I might fail to adequately pinpoint the core of his work, or to put it another way, the value his work has added and the validity of his approaches. This was coupled with an obvious challenge: the task was clearly "reductivist" in nature, focusing as it does on just five scientific contributions when Roberto Camagni's research output is so much broader.

Naturally, I accept this latter limitation, and I also very much hope that he will not read these pages with dissatisfaction. Roberto has earned extensive respect worldwide as an economist strongly specialised in Regional and Urban Economics. That cannot be said of many researchers. It is something that happens, as I explained at the beginning of this text, when an author is able to generate new ideas and new approaches to topics that were already known and to other, lesser-known topics, through analytical rigour and creative capacity. Those have certainly

been the guiding principles of Roberto Camagni's work, and we all hope they will continue to be for many years to come.

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Spatial Diffusion of Pervasive Process Innovation

3

Roberto Camagni

3.1 Introduction

Only a few years ago it was reasonable to maintain that the theory of spatial innovation diffusion was situated in a "spacious cul-de-sac" (Blaikie 1978). On the one hand, the very limited and dispersed empirical research carried out was not an adequate basis for generalisations of any real substance, or far the proposal of new conjectures or credible research assumptions. On the other hand, the only line of theoretical or empirical analysis of a purely spatial origin to focus on the channels of communication and the diffusion of information (Hägerstrand 1967) appeared to apply uncritically to the social sciences and was derived from models in other sciences such as epidemiology.

Now the situation is vastly different, even though a unifying and accepted theory of the spatial diffusion of innovation has yet to be written. The state-of-the-art of theoretical analysis and research on this topic was examined recently at a Seminar organised by the Italian Regional Science Association (Camagni et al. 1984). An important element of a general nature was brought to light in the papers presented at the Seminar. The introduction of the spatial dimension in the analysis of the innovation diffusion is not just a further dimension to an already complex problem, but it also plays a part in highlighting a number of fundamental, genetic aspects of actual diffusion processes. Moreover, the importance of the spatial aspects of the diffusion process on the spread of economic development and technological

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progress is an idea which has been increasingly emphasised in the most recent thinking of industrial economists. Evidence of this thinking is found in the concept of *selection environment* put forward by Nelson and Winter (Nelson and Winter 1977, 1982; Thomas 1984), in Marshall's much older concept of *industrial atmosphere* and in the theory of the product life cycle which was first advanced in the context of urban economics (Vernon 1957).

This paper presents an outline of the elements and variables which have a particularly significant effect on the diffusion process together with a simple model which expresses the fundamental nature of this process: the fact that it is *a dynamic process,* one whose history has an influence on the very nature of innovation and its range of potential adopters, sometimes called its *application potential*. The results summarise a survey conducted on the industrial robotics sector in Italy, which was organised in accordance with the methodology.

3.2   The Firm/Environment/Technology Interface

To understand the process of innovation diffusion, three fundamental elements must be considered in terms of their properties and their systematic interactions. These elements are the firm, the environment, and technology. The area of interface, or more precisely, the area of integration of these elements establishes the set of preconditions for the adoption of an innovation, and each of these interfaces is at the centre of one of the phases of the decision-making process (Fig. 3.1).

There is a fairly general consensus about the characteristics of *firms* which are most likely to facilitate the rapid adoption of innovations. They are related to the

Fig. 3.1 Elements, preconditions and phases of the process of innovation diffusion
Elements: Technology (T), Firm (F), Environment (E)
Preconditions: Information, Profitability, Adjustment costs
Phases: Awareness, Consideration, Decision
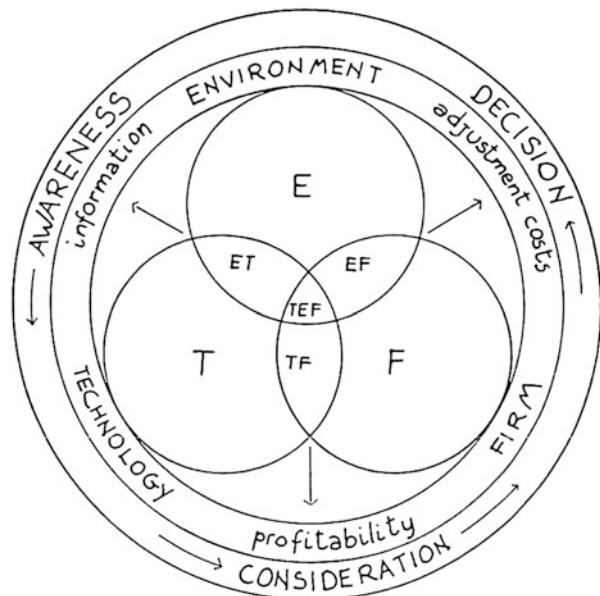
age of the firm and its plant, whether it belongs to large industrial or financial groups, its sector of activity, its style of management, its integration of research and marketing functions, its expenditure on research and development (R&D) and its internal organisation. In particular, the ability of a firm to realise and ably exploit the potential of a technological or commercial idea, its receptiveness towards information and its flexibility in a turbulent environment all depend on the adoption of an *adaptive* internal organisation as opposed to a *mechanical, non-creative* one. The former is characterised by the existence of limited regulations or procedures, workloads which are notable for the absence of routine, wide areas of responsibility, and free communication between people rather than their positions. Essentially it is typified by the continual redefinition of individual responsibilities, a weak hierarchical control structure, a more limited sense of loyalty towards superiors and a consultation network of horizontal communications which are not geared to the reporting line and control structure. These characteristics are all typical of firms which operate in the first phase of the product life cycle (Burns and Stalker 1961; Baker and Sweeney 1978).

Analyses of *technological* diffusion have shown that its speed depends largely on the internal properties of the innovation concerned. The following properties of the technology are the most important in this respect: its compatibility with existing organisational structures; its complexity and appropriability; its advantage over the technology it replaces; its potential miniaturisation; its cost, and its communicability and pervasiveness in relation to potential adopters in different sectors (Rogers 1962; Hayward 1979).

Lastly, the characteristics of the *environment* have more recently been described as fundamental (Nelson and Winter 1982; Kamann 1984) because they represent the economic and infrastructural preconditions necessary for the circulation of information. In addition, the environment provides the base for those psychological, cultural and social variables which define the level of education, the taste for risk, the capacity for extensive organisation and attitudes towards technology. The environment might also encompass the opposition to change on the part of social groups and the unions.

It is at the point where these three systems (firm, environment, technology) are satisfactorily integrated that the preconditions for the adoption of the innovation emerge (Fig. 3.1):

(a) in the Environment/Technology (E/T) integration area there are the problems of communicability and complexity for the technologies that are connected with resources in terms of service facilities, levels of education and communication infrastructures. In this area a strategic element, the *availability of information,* is located which is the first precondition for the adoption of innovations. Here the decision-making phase involved is *awareness* (Nabseth and Ray 1974);

(b) in the Technology/Firm (T/F) integration area there are the strategic problems of compatibility and the relative advantage of the new technologies over existing ones. These are connected to the prospected timespan of the firm,

the flexibility of its organisation and the level of depreciation of its existing plant. This area is involved in the definition of the second precondition for adoption which is the *relative profitability* of the new technology or innovation that triggers off the second phase of the decision-making process— *consideration*;

(c) in the Firm/Environment (F/E) integration area the last element which the firm has to evaluate is the *cost of adjustment* from the old technology to the new (Scherer 1980), a factor which is often underestimated in the analysis of information diffusion. For a new technology to be adopted it is not sufficient that it demonstrates superiority over the existing one. It is also necessary that the present value of the differential earnings expected from the new technology be higher than the costs which have to be met to bring the structure of the firm into line (Camagni and Cappellin 1984). These costs are a function of variables existing both within the firm, for example, R&D, and sales ability in the case of a product innovation, and outside it, for example, the possibility of obtaining special loan facilities, and political and union-dependent obstacles. This point leads to the final and decisive phase of the decision-making process termed *adoption* which, in topological terms, is situated in the central area of Fig. 3.1.

3.3   The Diffusion Process

For the potentially adopting firm, the innovation diffusion process goes through three distinct phases: awareness, consideration and actual adoption.

These are based on different decision-related parameters or variables: information, profitability and adjustment costs.

The model most frequently used in the past to simulate the diffusion process is a logistic behavioural model of the type

$$\dot{X}(t) = \beta X(t)\big[(n - X(t)\big], \tag{3.1}$$

where $\dot{X}(t) = X_t - X_{t-1}$ is the variation in the number or percentage (cumulative) of adopters, β is the *adoption coefficient* and n the *application potential,* that is the equilibrium number or percentage of potential adopters to which the logistic curve tends asymptotically. The solution to this differential equation, which can be estimated econometrically, is given by

$$X/(n - X) = e^{a+bt} \tag{3.2}$$

where $b = \beta n$ is the *diffusion coefficient* and measures the speed of the process.

This model is an entirely satisfactory representation of the so-called epidemic approach to innovation diffusion, which assumes a stimulus appearing at a certain time, a homogeneous population with an equal probability of being reached by the

epidemic and a process with a constant contagious force through time (the parameter β). Under these assumptions, the rate of diffusion $\dot{X}/X$, is directly proportional to the number of firms who have adopted the innovation and to the number of firms which remain untouched before the saturation point is reached. The parameter b, estimated for several different innovations, can subsequently be interpreted econometrically in terms of the variables reflecting characteristics of the individual innovations (profitability, cost, or some other), which was demonstrated in the well-known, pioneering contributions of Mansfield (1963).

A number of criticisms can be made of this model. The first concerns the definition of *application potential*. Generally this term is taken to embrace the entire sector effected by the new technology after its superiority to the previous technology has been ascertained. Such a position can only be accepted in the long term especially if the final objective is a spatial analysis. A *technological pluralism* can exist for a good many years if the relative profitability of the new technology differs greatly from one territorial factor market to another.

When a new scientific paradigm comes into being, it does not automatically replace the old one in a short space of time. This delay may be attributed to the lack of universal scientific criteria for establishing its superiority. Were such criteria to exist, even in the apparently simple form suggested by Popper of greater empirical content, greater generalisation, more corroboration and the putting forward of new facts, scientists themselves would think little of them because of their dogmatic loyalty to previous paradigms or research programmes (Lakatos and Musgrave 1974). In the same way, when a new technological paradigm (Momigliano and Dosi 1983) comes into being its adoption is not only geared to the random mechanism of information diffusion, which potentially addresses the entire population, but also to the perfectly rational opposition connected with the fully realised costs of change and the profitability of the same innovation in different contexts.

In this case the value of the asymptote *must* be included among the variables to be estimated, either with iterative processes on the model presented above or, when statistics make it possible, by using information and competition matrices among the alternative innovations in the way proposed by Sonis (1981). This method, which also treats space in a way which is still implicit, can give significant results in theoretical terms because it shows how the *winning* technology can, in certain conditions, allow a *dominated* technology to survive in particular economic or spatial circumstances. This survival can happen as a result of conservatism in face of change. In addition, vested interests might force the periphery to adopt technologies which are obsolete, although not written off, in the centre. Survival may also occur through the interest of those who maintain a monopolistic leadership position by hyper-sophistication and the planned, limited appropriability of the innovation.

The adoption of an innovation also depends on its relative profitability which can change due to reductions in the cost of its acquisition leading to an upward shift in its potential applications (Metcalfe 1981, 1982). These changes directly concern the second criticism which relates to the dynamic nature of the innovation process. A

different rate of innovation adoption through time can stem from a new attitude within its diffusion environment caused by the accumulation of information by its previous adopters and provided for by the logistic model. However, it is also possible for this rate to respond to the endogenous evolution of the innovation itself, both in its technological and market-related characteristics (Davies 1979; Gold 1981).

Therefore, an innovation cannot be statically defined at the start of its diffusion process because its characteristics are time dependent and change the set of possible adopters. In terms of the analytical model, what is involved is no longer a single curve, but the envelope of several successive logistics, each one relating to a certain set of environmental and technological characteristics (Metcalfe 1982).

This intuition can be simulated by means of a model which assumes a two-stage diffusion process: first, an inter-firm stage within a production segment or sector, and second, an inter-sectorial stage between different production segments or sectors, or categories of firms. In other words, not only is there the diffusion of a process innovation within a segment or a sector or a homogeneous group of firms but, as time passes, the innovation itself undergoes an incremental change. Information above its positive adoption in certain segments becomes widespread accompanied by an increase in the range of firms to which the innovation can be applied. This latter, inter-sectorial diffusion also takes place along the lines of a logistic model which effectively simulates the processes of information diffusion and learning from the experience of the other production segments.

This entire process can be represented analytically through a system of two simple differential equations, in which the asymptote n of the previous Eq. (3.1) is no longer exogenously given but becomes a function of time such that

$$\dot{X}(t) = \beta X(t)\big[(n(t) - X\big], \tag{3.3}$$

$$\dot{n} = an[m - n(t)].$$

Solving Eq. (3.3) we obtain

$$n/(m - n) = e^{a+bt} \tag{3.4}$$

$$n = me^{c+dt}/(1 + e^{c+m\alpha t})$$

and recalling that $d = m\alpha$ and replacing it in (3.2), we obtain

$$\dot{X} = \beta X[me^{c+m\alpha t}/(1 + e^{c+m\alpha t})] - X \tag{3.5}$$

This last differential equation is not autonomous since t appears explicitly in the R.H.S. and makes its analytical solution difficult. Its behaviour can nonetheless be analysed through ad hoc simulations and a number of interesting properties can be deduced.

(a) The curve is sigmoidal with the asymptote equal to *m* (in the case in which α is $\neq 0$). The number of adopters therefore tends towards the general asymptote of the two diffusion processes, which in the case of *pervasive* innovation can be fixed equal to 1 (the universe of concerns). When $\alpha = 0$, the curve is reduced to the traditional logistic of Eq. (3.2) since the expansion of the sectors of possible adopters no longer applies;

(b) the trend of the curve depends on the parameters *c*, α and β in addition to *m*. In particular, the parameter *c* governs with *m*, which is taken to be equal to 1, the initial value of the asymptote when $t = 0$. The diffusion process tends to this limit during the phase which we can define as *experimental*. The parameter β, that is the *coefficient of interfirm or intrasectorial adoption*, is the most powerful element and governs the speed of the diffusion process. The parameter α, that is the *coefficient of intersectorial adoption*, governs the shape of the curve and, in particular, its movement away from the symmetrical trend of the logistic before and after the point of inflection. In economic terms, it permits the simulation of a very slow process of initial diffusion and a faster process of saturation, which happens when the number of sectors interested in the innovation from the start is low but then increases rapidly. Conversely, it may represent a fast initial diffusion and a slow saturation, which happens when a large initial success in certain segments is not followed by an equally rapid success in others;

(c) a deviation of the first kind, that is *delayed* diffusion, is most likely to occur when $\alpha = \beta$, while a diffusion which is *accelerated* in its preliminary phases occurs when α is considerably lower than β and the initial asymptote is high. When α tends towards 0 and $\alpha > \beta$, the curve comes close to the logistic form (Table 3.1).

To summarise, the diffusion process can be analysed as an envelope of two processes defined by the values of four parameters. It does not imply the ex-ante quantitative definition of an initial asymptote *(n)* and allows for the possibility of a nonsymmetrical process in both the initial and final phases.

Despite its complexity, Eq. (3.5) can be estimated econometrically in a relatively easy way. By changing the order of the terms and defining a new variable *W*,

$$\dot{X}/X = \beta m(e^{c+m\alpha t}/1 + e^{c+m\alpha t}) - \beta X$$

we obtain

$$W = \beta X + \dot{X}/X,$$

$$W = \beta m(e^{c+m\alpha t}/1 + e^{c+m\alpha t}).$$

The following transformations:

Table 3.1 Parameters and indexes of the dynamic simulation

		$\alpha = 0$	$\alpha = 0.05$	$\alpha = 0.1$	$\alpha = 0.2$	$\alpha = 0.4$	$\alpha = 0.6$
$c = 0$	$\beta = 0.1$						
	t max.	155	115	99	96	94	93
	t (50)	78	61	55	51	49	48
	S	1	1.05	1.10	1.06	1.04	1.04
$c = 0$	$\beta = 0.2$						
	t max.	77	98	57	50	48	47
	t (50)	39	36	31	28	26	26
	S	1.01	0.73	1.07	1.12	1.08	1.08
$c = -1$	$\beta = 0.1$						
	t max.		132	99	99	96	95
	t (50)		74	61	54	51	50
	S		1.12	1.22	1.10	1.06	1.05
$c = -1$	$\beta = 0.2$						
	t max.		118	66	53	50	49
	t (50)		48	37	31	28	27
	S		0.81	1.12	1.18	1.12	1.10
$c = -3$	$\beta = 0.1$						
	t max.		170	124	108	100	98
	t (50)		109	79	64	56	53
	S		1.28	1.28	1.18	1.12	1.08
$c = -3$	$\beta = 0.2$						
	t max.		158	85	62	54	52
	t (50)		83	56	41	33	30
	S		1.05	1.30	1.32	1.22	1.15

(a) t max $= t\ (X = 0.99)$ (if $c = 0$ and $\alpha = 0$, then t max $= t\ (X = 0.49)$)
(b) t (50) $= t\ (X = 0.50)$ (if $c = 0$ and $\alpha = 0$, then t (50) $= t\ (X = 0.24)$)
(c) S = index of distance form a symmetrical logistic behavior $= \frac{t(50)}{t\max/2}$

$$W(1 + e^{c+m\alpha t}) = \beta m e^{c+m\alpha t}$$

and $W/(\beta m - W) = e^{c + m\alpha t}$ lead to the final expression

$$\ln\left[W/(\beta m - W)\right] = c + m\alpha t.$$

This expression can be estimated econometrically by pre-establishing the value of β and setting m equal to 1. This realistically assumes that the whole of the industry will be interested in the introduction of *pervasive* process innovations such as microelectronics and flexible automation. In any event negative cases will be easily identified.

The method that has been proposed has some interesting features. It explicitly takes into account the intrinsic dynamic nature of the innovation process and lends itself to the interpretation of the diffusion of inter-sectorial, horizontal and pervasive technologies which, today, are of the greatest theoretical interest (Momigliano

1982; Dosi 1982). It makes the separation of an intrasectorial coefficient of adoption from an intersectorial one possible and lends itself to a territorial type of analyses. The analysis of sectorial adoption differentials is levelled out because the same diffusion speed β is assumed for each of them. Thus the horizontal dimension prevails over the vertical.

3.4   Spatial Diffusion of Innovation

For the individual firm, the adoption process is based on the phases and preconditions shown in Fig. 3.1: the possibility of access to information, the estimation of profitability and the evaluation of adjustment costs. The spatial element is not neutral with respect to each of these phases because it determines the general *technological climate* and the market for those factors which have the greatest influence on the profitability of an innovation.

In advanced economic systems some kind of interregional spatial homogeneity can be assumed for the possibility of access to information. Such an assumption is warranted by the greater speed with which stocks of available information are updated with respect to the structural, psychological and socioeconomic aspects of firms and their environments. However, for the other two variables, which define the very nature of a firm's receptiveness, this same assumption cannot be adopted.

Innovation diffusion models which follow logistic curves are therefore highly suited to the simulation of either the first phase of the innovation process, or to the diffusion of simple economic phenomena where it can be supposed that information alone implies adoption. But such models are not able to adequately represent the subsequent phases of the decisionmaking process where a random distribution of receptiveness to the innovation is assumed in a more or less explicit way. But if this receptiveness differs from region to region, then this variation will contradict the fundamental assumption upon which aggregate logistic models are based, namely the equal probability of each firm's adoption of the innovation in question.

The heterogeneity of the economic environment therefore not only deserves to be analysed, but must be taken into consideration explicitly because it undermines the possibility of an aggregate analysis. Strictly speaking, as subsequent adoptions of an innovation imply active imitation, characterised by minor, marginal improvements, we should talk in terms of progressive adaptation and acclimatisation to different spatial environments rather than diffusion.

Re-examination of the pioneering contribution made by Torsten Hägerstrand (1967) will reveal that his fundamental idea, which has been the basis for so many later studies, also represents the limits of this contribution. The idea of innovation as the dissemination of information, which is spread by interpersonal communication impulses, simplifies the diffusion of technological progress, which has economic roots, to a degree which is currently unacceptable.

Using Monte Carlo methods to simulate the effects of a mean information field calibrated according to the spatial pattern of commuter movements and telephone calls, Hägerstrand obtained a diffusion process which represented a neighbourhood

effect working both from centre to periphery and along the branches of the urban hierarchy. But his attempts to include the differing receptiveness of the population in the model again employ a measure of information intensity: "a person becomes more and more inclined to accept an innovation the more often he comes into contact with other persons who have already accepted it" (Hägerstrand 1967, p. 264).

A possible way of overcoming this stumbling block without abandoning the important results already presented in both the economic and geographical literature, is to express the spatial element as economic distance rather than physical distance to reflect the differential economic characteristics of the various regions previously assumed to be internally homogeneous as receptors of innovations. This revised specification leads to the model:

$$\left(\dot{X}/X\right)_r = f[t, Y_r, Z_r(d_{r,s})]$$

Here Y is a vector of structural economic characteristics (size and age of concerns, wage and profit levels, existence of public incentives, etc.) of area r, and Z is a vector of economic and spatial characteristics of region r defined in terms of its potential with respect to its interregional context (access to private, commercial and technological services, market potential and access to the major transport and communications infrastructures). The term $d_{r,s}$ is the distance of area r from all other areas s.

The model may be assessed in two phases. First an estimate of the traditional logistic model, if necessary in the modified form to allow for inter-sectorial effects, made for each region r on its historical series describing the cumulative number of adoptions. Second, an interpretation of the parameters β (and α) and c, which represent diffusion speed and the time lag, by means of an interregional cross-sectional analysis on the variables Y and Z.

The patterns described so far concern the diffusion of a single innovation with some marginal variations. On a theoretical level they appear to be more than adequately conservative from a spatial point of view and are justified by the following properties which occur at the centre of the diffusion area: first, there is more information and research, greater readiness to undergo change by both the factors of production and the market, and the availability of skilled factors which are all important for product innovations; second, process innovation is typified by learning which favours those who already produce; third, the unitary returns on factors of production are higher in the initial phases of the innovation cycle; and lastly, powerful cumulative processes are at work which encourage specialisation at the centre in the *nobler* phases of the production cycle and the selective decentralisation in the subsequent phases.

In contrast, there are recent important phenomena such as the long-run homogeneity of supplies, the quality of production factors over the territory and the shortening of the product life cycle, which undoubtedly limit the disadvantage of the periphery but are not able to reverse the direction taken by the process as a
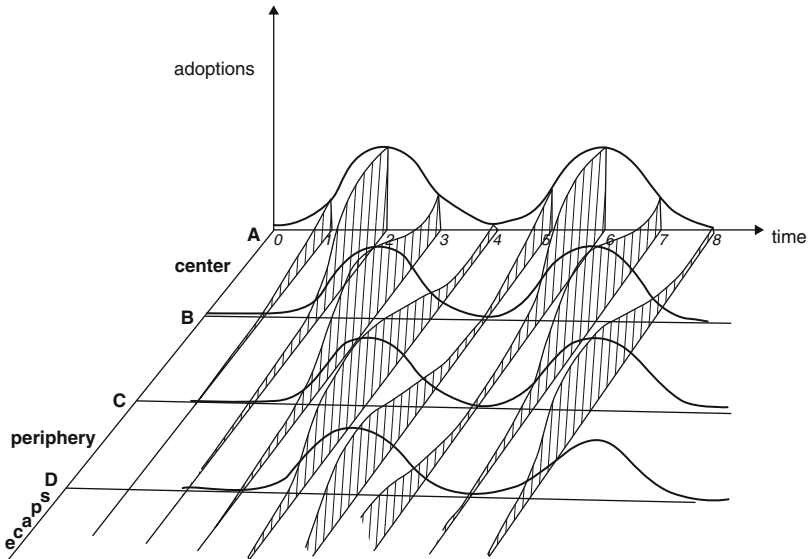
Fig. 3.2 Temporal and spatial diffusion of single innovations and of systems of innovations

whole. The possibility of the periphery being able to catch up more rapidly may be illustrated by analysing the whole set of innovations which spread simultaneously in a given space-time segment. If individual innovations and first adoptions tend to cluster in time in fairly regular cycles as Schumpeter guessed and Mensch and Marchetti more than adequately demonstrated (Mensch 1979; Marchetti 1980), and if, though with the necessary caveats (Freeman et al. 1982, Chap. 3; Sylos Labini 1983), we observe the simultaneous diffusion in time and space of the various innovations constituting the technological system, it is possible to ascertain a greater tendency towards innovation on the part of the periphery compared to the centre either through imitation or incremental innovations (Camagni 1982, 1984) (see Fig. 3.2).

3.5   Diffusion of Industrial Robotics in Italy

To illustrate the theoretical considerations developed so far a summary of a study of the diffusion of industrial robotics in Italy is given. This survey covered all Italian manufacturers and focused on the genetic, locational and development related elements of the firms together with the economic and locational characteristics of their customers. The results have been presented in greater detail elsewhere (Camagni and Pattarozzi 1984; Camagni 1984).

The diffusion of industrial robotics is an intrinsically dynamic phenomenon when considered as a process innovation. During the actual diffusion process changes take place both in the nature of the innovation, as the result of an

incremental learning process, and later in the attitudes of the environment and in the extent of the application potential. Compared with the original robots to be installed, which were mainly fixed sequence manipulator robots, far-reaching changes have now taken place in their complexity and type of control (the variable sequence and numerically controlled robots), in the flexibility and reliability of the machines and in the type of functions they can be set to perform. At the same time there has been an increase in the number of production segments and sectors which use them. The original automotive, domestic appliance and machine tool sectors having been joined by new and less predictable sectors such as ceramics, glass, textiles, foods, metal, plastic and wooden forniture. In addition, small and medium sized concerns have now made their appearance in this market due to the growing possibilities for using robots in small scale processing procedures and on differentiated products which can be grouped together in small homogeneous series.

The diffusion process is not only based on information but also on complex calculations about the economic advantage of the new technology and the adjustment costs involved in changing from old to new. In this case these evaluations are highly complex and also imply a considerable risk. A fact which limits faster diffusion, particularly among small firms, and imposes additional charges on the manufacturer who is forced to carry out an analysis of the costs and benefits of the new production organisational structure for his customer.

To permit its full exploitation, this technology requires overall reorganisation of layout and production, and not just simple replacement of man with robot based on an anthropomorphic conception of the machine's functions. It is only recently that people have become aware of this important point. Adjustment costs are consequently very high, and are borne partly by the manufacturer (the applied research and design costs of each single order) and partly by the customer (the production risks and potential internal unrest).

Industrial robotics is an innovation which offers high relative profitability and is potentially a way out of the recession which has hit manufacturers of traditional machine tools. However, costs are high and considerable adjustment problems have to be faced such as the recruitment of skilled technical staff, the retraining of technicians and the internal mobility of manpower. Finance is also a serious barrier, not so much in the entry phase when the small, internally generated resources could be sufficient, but in the development phase with its high risks and long, jobbing cycles.

Given these characteristics the location of producers is spatially highly concentrated, which reveals the conservative nature of the innovation process. These concerns are concentrated in the areas which have a long-established industrial and technological culture, such as Turin's authoritative science park, Lombardy and along a line through Emilia. This distribution is essentially metropolitan, although the concerns are not necessarily located at the centre of the metropolitan areas.

The diffusion of robotics as a process innovation shows a pattern (see Fig. 3.3) which is also fairly conservative. Starting from central (regional) nodes, it moved
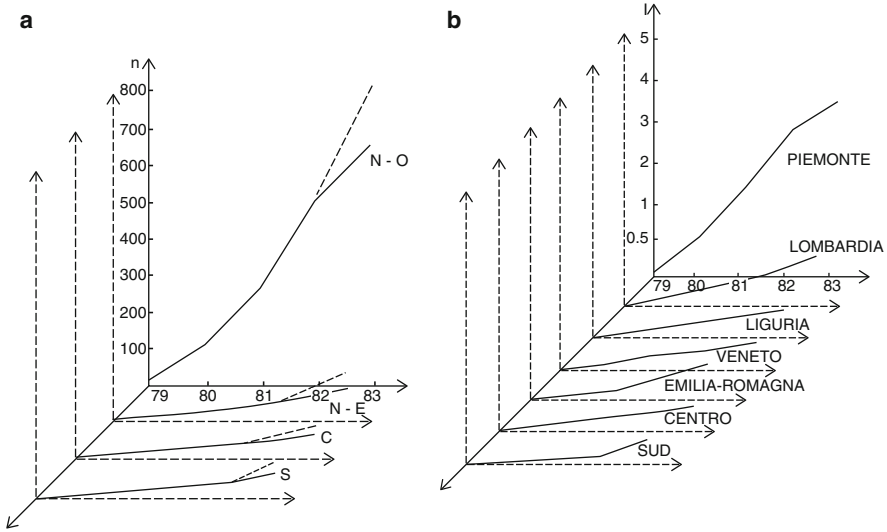
Fig. 3.3 Cumulative adoptions of industrial robots by customers' location (**a**) absolute number of adoptions, (**b**) index of cumulative spatial concentration (*). (*) $I_t = \sum_{t=1979}^{T} \frac{R_{r,T}}{R_{n,1983}} \times \frac{E_r}{E_n}$, where: R = number of robots; r = region; n = nation; E = manufacturing employment 1981

along the top branches of Northern Italy's urban hierarchy and eventually reached the intermediate and peripheral regions through proximity or the decision making channels of multiregional firms. For a comparison with similar results obtained in other contexts see Oakey et al. (1980) and Thwaites (1981). With regard to the periphery, there is evidence that innovation has begun to occur in the South in the last few years. The maximum concentration, in both absolute and relative terms, is nonetheless in Turin and Piedmont, and in Lombardy. This concentration can be interpreted alongside the very recent signs of the relaunching, or redeployment, of production and technological activities in these areas after a long period of stagnation.

Finally, for the near future, it is not possible to predict a drop in the selling price because of the high cost of the soft side of the investment. Instead a rationalisation of the entire product with the introduction of robots in complex automation systems is expected. The leadership role in the development of these future systems has still to be established, but it is already clear that it will be played by companies which construct automation systems and by engineering companies. Small constructors are unlikely to lead in this field given their present, limited capacity to handle the overall organisational and technological demands of their customers.

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Technological Change, Uncertainty and Innovation Networks: Towards a Dynamic Theory of Economic Space

4

Roberto Camagni

4.1 Introduction

The theoretical and empirical literature on the relationships between space and technological change is literally immense, and scattered along different directions that may be listed tentatively in the following:

– the theory of innovation diffusion;
– the spatial geography of R&D;
– the spatial preconditions for (and obstacles to) innovation: presence of human capital, availability of producer services, 'urban' environment, industrial structure;
– the characteristics of innovative environments: valleys, corridors, routes, parks; the 'Third Italy' phenomenon; the 'milieux innovateurs' of the new Gremi approach (see below);
– the regional differentials in productivity growth;
– the effects of technological change on regional development the effects of technological change on urban development;
– the spatial effects of specific technologies: industrial automation, information technologies, telecommunications, . . .

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The aim of this paper is not really to make an overview of this literature; the task would be overwhelming in comparison to the scarce resources of a single researcher and the limited ambitions of a paper.

A different perspective seems however more fruitful in the present state-of-the-art of our discipline, as far as technological change problems are concerned; namely:

(a) to inspect in some depth the characteristics of the *new scientific paradigm* through which the field is approached by general, non-spatial economic theory, the *evolutionary paradigm*;
(b) to link it with the *new 'network' behaviours of firms* in their struggle for dynamic excellence; and
(c) to highlight the *role of spatial variables* in the new interpretative context.

My approach starts therefore from the consideration of these three open issues, which in my view lie near the frontier of the present scientific debate and call for new substantial theoretical and empirical efforts. My general hypothesis is that, within the new 'evolutionary' paradigm, spatial variables are no longer relegated to a peripheral condition in the theoretical framework, no longer play the role of a simple extra-dimension of the problem, but represent central elements of the interpretative framework itself. This fact is particularly interesting in a context where the new firm behaviours of transnational cooperative agreements and network linkages at a first glance seem to annihilate space as a relevant economic operator.

In the theoretical framework that will be built throughout the chapter, the local spatial context, or the local 'milieu', will emerge as a necessary and crucial element in the process of technology creation and as the 'operator' that allows the individual decision-maker to cope with the problems of static and dynamic uncertainty which are intrinsic in innovative behaviours. The reflections presented here may therefore be intended as prolegomena to a new theorization of economic space in a dynamic context.

The characteristics of the emerging scientific paradigm in the study of technological change will be inspected first, keeping in mind both its actual limits of general consistency, coherence and completeness, and the important efforts made by the best representatives of the 'traditional' theory in enlarging its explicative power beyond abstract and often meaningless cases (Sect. 4.2).

Then the new behaviours of firms will be analyzed when, in a dynamic and innovative context, they are facing inescapable problems of 'uncertainty', imperfect and costly information collection, limited forecasting capability and rationality (Sect. 4.3). The central role of network relationships, developing both at a local-informal and at a formal-trans territorial level, will become clear in this context (Sects. 4.4 and 4.5).

Thirdly, the problems of innovation adoption and diffusion will be taken up in terms of evolving and competing technologies on the geographical pace (Sect. 4.6), and the most appropriate modeling approaches will be discussed.

4.2   The Emergence of the New 'Evolutionary' Paradigm in the Study of Technological Change

Traditional economic theory has directly transferred to a dynamic setting almost all the explicit or tacit assumptions that were employed to study optimizing firms' behaviours in the static context of given and perfectly known technologies. Conditions of perfect knowledge are projected along the time horizon of the firm, hypothesizing perfect foresight on both technological advances and their economic outcomes, and a perfect and 'rational' utilization of the existing information. Standard-choice theory assumes therefore hyper-rational, never-failing agents which always select actions in order to maximize expected utility based upon observed and free information.

In this framework, technological change is not really explained, but only 'assumed' and instantaneously adopted by firms (if the new technology proves itself superior to all previous ones in all points of the factor-price frontier, as often happens). In a world where technology is equated to perfectly free information (Arrow 1962) and where actors' expectations are by definition 'rational', all that firms have to do is dip into the pool of technological know-how (become a sort of public good), optimizing an inter-temporal objective function.

Needless to say, this vision trivializes both the concept of technology and the concept of time in economics. In Prigogine's words, dynamics is reduced to 'a movement in a timeless time', with no role to irreversibility, 'memory', or history. Along the same lines, Frank Hahn, the champion of most advanced neoclassical theorizing, has questioned the rationality assumptions in the presence of incomplete information and imperfect markets and has suggested that, on the contrary, 'dynamics should be viewed as a learning process both about demand conditions and the strategies of near competitors. When an equilibrium is defined relatively to such (dynamic) processes, it seems that they are undetermined unless history—that is information—is explicitly modelled and known... There is something essentially historical in a proper definition of equilibrium and of course in the dynamics itself' (quoted in Freeman 1988).

The new 'evolutionary' paradigm in the scientific interpretation of technological change emerged because of similar dissatisfactions, and committed itself to the full consideration of such 'real life' elements as imperfect information, limited search capabilities, 'bounded' rationality, cumulative learning processes, static and dynamic uncertainty, even at the expense of a lower formalization and a limited prediction capability. Pioneered by the works of Nelson and Winter (1982), the new approach was quickly developed thereafter and recently received an important state-of-the-art presentation (Dosi et al. 1988).

As the new approach takes these elements of market imperfection and uncertainty directly into account and incorporates the very nature of the Schumpeterian creative innovation processes, its main concern appears almost at the opposite side with respect to those of the neo-classical one. In the latter case, the evidence of a wide spectrum of differentiated, lagged and unexpected behaviours conflicts with the geometrical perfection of the theoretical model and its prediction of a unique

optimal solution for all firms in each market. On the contrary, evolutionary approaches have to explain why and how the apparently anarchistic process of innovation creation and diffusion does not end up in a purely random aggregate phenomenon, but in a self-organized and ordered process showing regular patterns of change.

The rationale for this ordered pattern is found in the intrinsic learning nature of technological change, showing up on the double level of *microeconomic learning processes* (in both research units and firms) and *social-institutional learning processes*. These processes, embedded in the very nature of technological change, constrain its evolutionary path along ordered 'technological trajectories' and long-term, cyclical waves (Dosi 1982; Dosi and Orsenigo 1988; Peres 1985; Freeman and Peres 1986). At the microeconomic scale this effect stems from:

– the presence of specific technical properties, reducing the spectrum of possible behaviours;
– the sharing of similar problem-solving heuristics among firms;
– the cumulative agreement in the society on the definition of relevant problems and targets;
– the use of decision routines which limit the spectrum of possible actions;
– the cumulative nature of 'incremental' innovations within each 'technological paradigm'.

At the macroeconomic scale, 'order' may come from socio-cultural and institutional resistances to change and from the stabilizing characteristics of the economic and political rules that define each 'régime de régulation' (Boyer 1986).

According to the new approach, technological change may be interpreted and 'stylized' in the following way:

(a) it is an irreversible, path-dependent and evolutionary process, stemming from the behaviour of economic agents which explore only a limited part of the set of theoretically possible actions, that part which is strictly linked to previous innovation adoptions and to already acquired know-how. This is far from the traditional view of technological change as a fast, flexible and optimal reaction to changing market conditions, choosing among a wide spectrum of perfectly known alternatives;
(b) it lies therefore on a cumulative learning process, resulting in the 'creation' rather than the simple 'adoption' or imitation of already existing ideas (inventions or innovations);
(c) it implies search and decision routines which limit the cost of information collection and the cost connected with the presence of uncertainty;
(d) it implies the full commitment of all functions of the firm, and in particular a deep interlink among R&D, production, marketing and organization;
(e) due to its dependence on internal learning processes (learning-by-doing, by-using, by-searching and, more indirectly, learning-to-learn) it cumulatively

builds on tacit, firm-specific know-how and on 'intangible' assets: its transfer or imitation is therefore a highly difficult process;

(f) its historical path may by no means be interpreted in terms of 'optimality'. From a macro point of view, in fact, its path-dependent nature and the non-linearities connected with the learning processes may act as dynamic 'entry-barriers' with respect to possible, possibly more efficient, alternative technologies. Once a bifurcation point is overcome in the development path of a particular technology and a specific trajectory is chosen, cumulative processes reinforce and perpetuate that choice, highly reducing the spectrum of possible outcomes and alternatives (see, as an example, the 'genetic' limits of nuclear power technologies, which deeply influenced the subsequent trajectory). On the other hand, from a micro point of view, conditions of limited information and 'bounded rationality' limit (or change) the meaning of optimizing behaviours.

New reflections are still needed for the full development of the new scientific approach to technological change. In particular, the definition and the meaning of possible 'evolutionary equilibria' have not been stated in a sufficiently sound way. Analogies from other sciences suggest to employ in this respect the concept of an '*attractor*', or a series of attractors, leading the evolution within each established technological paradigm towards some sort of stationary adjustment path (Dosi and Orsenigo 1988). These attractors, however, are thought as partly endogenous, in that they, too, are path-dependent and behaviour-dependent: 'it is the very process of approaching any one attractor which may well change the value of the attractor itself' (ibidem). By this, the entire process being modelled may become excessively cumulative and 'hyper-selective', depending almost exclusively upon initial conditions and opening the door to a new sort of 'technological determinism', similar in principle, though in a different theoretical context, to the old determinism of the production function approach (Gaffard 1986; Camagni 1986a).

Emphasizing perhaps a teleological element of a more subjective nature, I might better utilize the concept of an attractor to indicate the final goal assigned to technology in a specific historical phase of the capitalist society, which informally leads the incremental development of technological innovations. Goals of this kind may be found in the full exploitation of economies of scale and division of labour in the 'fordist' society, and in the attainment of full managerial control over the production conditions in the information and flexible automation society (Camagni 1986b) (see, for an example, in the latter case, the choice of programmable vs. 'play-back' factory automation technologies in the 1950s at MIT, clearly inspired by the objective of limiting the labour-force responsibility, which highly constrained the trajectory thereafter).

4.3   Uncertainty and the Innovation Process

In spite of these and other difficulties, the new approach to technological change in industrial economics brings important insights on the genetic elements of technical advances, in a way that in my opinion highlights the role of spatial variables in this context.

The key concept in this respect is that of *uncertainty* in its different forms. Uncertainty, and the correlated presence of imperfect 'information', prevents a pure price mechanism from allocating resources in an optimal way and driving economic activities to any kind of competitive equilibrium. In fact, as Arrow has shown (Arrow 1974), uncertainty can be incorporated in a competitive equilibrium system only by assuming an equal (imperfect) access of all individuals to the same information, a condition which, in the presence of highly differentiated firm sizes, market structures and spatial situations, is to be considered as highly unrealistic.

In their economic behaviour and decision-making processes, firms face five important kinds of uncertainty:

 (i) static uncertainty coming from an 'information gap' linked to the complexity, the width and the cost of the information collection activity; in the real world, the firm is usually left with a huge lack of relevant information on the occurrence of already known events;

 (ii) static uncertainty, coming from an 'assessment gap' linked to the difficulty of inspecting ex-ante the qualitative, mainly hidden, characteristics of inputs, components, production factors, technical equipment;

(iii) static uncertainty coming from a 'competence gap', linked to the firm's limited ability of processing and understanding available information; the existence of technical problems whose solutions are obscure are an example of this wide category of situations;

(iv) dynamic uncertainty coming from the so called 'C-D gap' (competence-decision gap); uncertainty in this case involves the impossibility of precisely assessing the outcomes of alternative actions, even in presence of full and free information on past events, due to the complexity of the decision problems themselves and inherently imperfect foresight. The probability of choosing a wrong or inferior technology is therefore large;

 (v) dynamic uncertainty coming from a 'control gap': the outcomes of present actions depend in fact on the dynamic interaction among independent decisions of many actors on which the firm has by definition a minimum control.

All these forms of uninsurable uncertainty and, in particular, the dynamic ones call for mechanisms of reduction of the general cost they imply. The firm therefore has to develop new and specific functions, rules, routines and procedures which are not considered in the conventional neoclassical theory of decision-making under conditions of perfect information, but which emerge indirectly from the new evolutionary approach to technological change. These functions are designed to

Table 4.1 Uncertainty and firms' behaviour: functions and operators

Sources of uncertainty	Type of uncertainty	Functions involved	Traditional instruments for coping with uncertainty	Outcomes	New "Operators"
Information gap (imperfect, costly information	Static	Search	Technology monitoring	Formation of beliefs on state-of-the-world	Local Environment or 'Milieu'
Assessment gap (presence of hidden characteristics	Static	Screening/signalling	Quality control/certification		
Competence gap (imperfect information, processing ability)	Static	Transcoding	R&D	Know-how acquisition	
Decision gap (imperfect assessment of decision outcome)	Dynamic	Selection	Decision routines/managerial style	Decision	
Control gap (imperfect control on others' decisions)	Dynamic	Control	Hierarchy	Reduction of complexity	Firms' networks and network-Firms

cope with each specific type of uncertainty, and may be listed as follows (Table 4.1):

(i) search functions and procedures regarding information collection, information organization, technological monitoring;

(ii) screening functions of market signals and inspection of hidden characteristics with regard to inputs and equipment; signalling functions and quality certification with regard to outputs;

(iii) transcoding functions, which translate external information into a language that the firm may understand. These functions are perhaps the most critical, though widely overlooked by economic theory, in that they control the process of inter-firm know-how transfer and information appropriation. Utilizing codified information, both freely available or costly, and merging it with tacit and informal information, transcoding activities convert a chaotic and unordered 'information' flow into a firm-specific 'knowledge' and possibly into potential business ideas at the disposal of the managerial decision-making. The main aim of the R&D efforts should be considered under this

new perspective, rather than on the traditional and naive perspective of the 'invention' task (Foray and Mowery 1988);

(iv) selection functions, governing the proper decision-making process through the adoption of decision routines and firm-specific management styles (Nelson and Winter 1982);

(v) control functions, aiming at a drastic reduction of the complexity of the external environment, through an expansion of the power limits of the firm. Long since, Williamson has pointed out that the most likely firm strategy in presence of limited rationality, imperfect markets, dynamic uncertainty and risk of opportunistic behaviours is an expansion of the 'hierarchy', through acquisitions, mergers and any other form of equity participation in the direction of both customers/supplier firms (vertical integration) and competing firms (horizontal integration) (Williamson 1985).

The first two types of functions address the creation of the firms' 'beliefs on the state-of-the-world' under conditions of imperfect information, and are implicit in the behavioural models proposed by recent neo-classical approaches to decision-making under uncertainty such as search theory, market-signalling theory and the economics of qualitative uncertainty (Hey 1979; Spence 1973; McKenna 1986). The third kind of functions, the 'transcoding' ones, control the process of technology transfer to the firm and the development of its internal know-how: they are hidden, mainly tacit functions and processes, often overlooked by economic theory, as mentioned before.

The fourth and fifth kind of functions, selection and control, project the firm into a truly dynamic context, and aim at reducing complexity both in the decision procedures and in the external context itself.

The instruments utilized within all the previously mentioned functions in order to reduce uncertainty and complexity (information monitoring, quality control and certification, R&D, decision routines and equity control) may be labelled as traditional in that they stem from a standard interpretation of the firm as an *individual* agent, clearly separated with respect to all other agents, interacting with its external environment only through the canonic (but abstract) 'operators' of *markets* (and market transactions) and *organizations*.

But these operators have proved to be highly inefficient, particularly in a dynamic context, one which is relevant in the perspective of technological change; therefore, some new, though equally imperfect, operators have to be found and added, both at the theoretical level and at the level of the real firms behaviours.

These new '*operators*', performing different but parallel tasks and, in particular, the task of 'reducing the degree of uncertainty in dynamic behaviours, may be found, in my view, in the *local environment* (the '*milieu*') and in cooperation networks among firms. Both imply specific functions, procedures, costs and risks, as will be clarified in the next section, and are linked by the nature of their genetic principle: synergy and collective action, as opposed to (market) competition and (organizational) *power*.
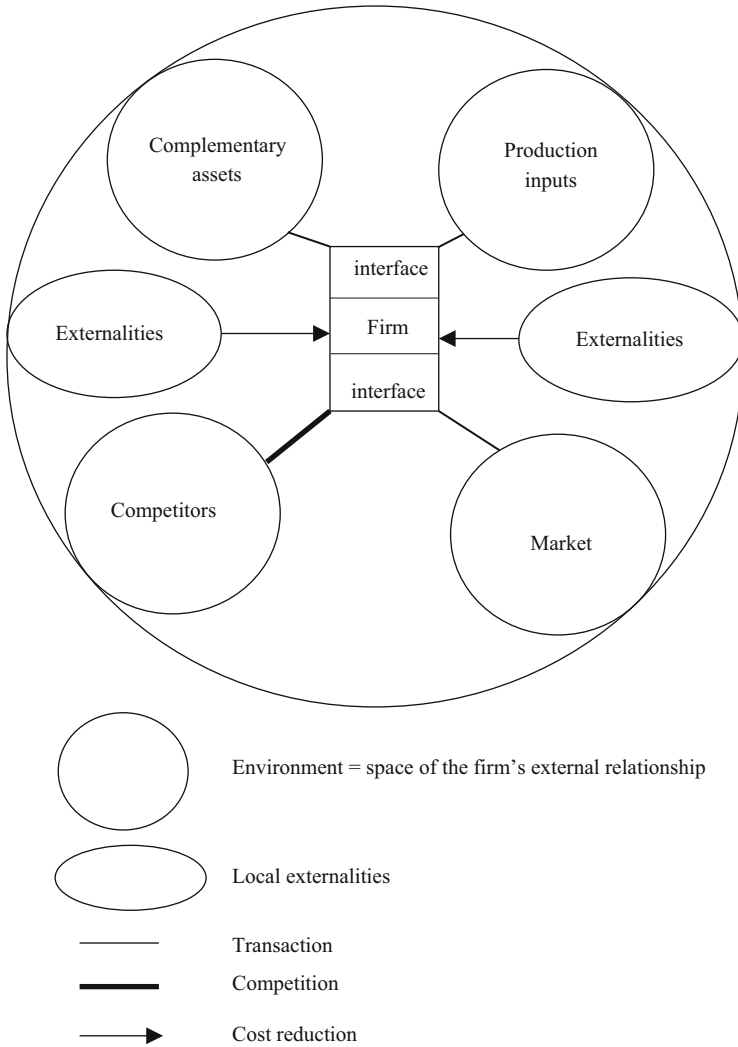
Fig. 4.1 The firm and its environment in a condition of perfect information and a static setting

4.4   The Firm and Its Local 'Milieu'

In a world of free and perfect information, the boundaries between the market and the organization (firm) are clear and stable; in fact, in the case of zero information and transaction costs, these boundaries are defined only by the shape of the organizational cost curve (Fig. 4.1). In order to communicate with the external environment, the firm utilizes internal interface functions like marketing and procurement offices.

But the presence of inescapable static and dynamic uncertainty in the real world and in particular in the process of innovation and technical change implies the presence of:

– extra-costs ('use costs of the market', in Williamson's terms), and therefore
– new functions to cope with these costs, as seen before, and therefore
– new 'operators' or institutions organizing these functions and shaping factual behaviours, beyond perfect markets and hierarchies.

In my view, the *local environment* of the firm, or the local '*milieu*' as it is called by the GREMI Association approach (Aydalot 1986; Aydalot and Keeble 1988; Maillat and Perrin 1990) may be considered as one, and perhaps one of the most important, of these uncertainty-reducing operators. In general terms, the local 'milieu' may be defined as a set of territorial relationships encompassing in a coherent way a production system, different economic and social actors, a specific culture and a representation system, and generating a dynamic collective learning process (Crevoisier et al. 1990).

In our specific theoretical context, the 'milieu' performs most of the functions mentioned in the previous paragraph, in strict integration and 'synergy' with the firm, through a *collective and socialized process* allowing cost reductions and enhancing the effectiveness of the dynamic decision-making process of local firms (Fig. 4.2). In fact, the local environment performs:

1. a collective information-gathering and screening function, through informal interchange of information between firms operating in the same markets, signalling of success decisions on markets and technologies, public or cooperative monitoring on factor markets and technical change, selection of information channels through repeated experience and 'memory' ('*search function*');
2. a function of '*signalling*' in the direction of the market of local firms, in terms of product image and 'reputation', cooperative advertising, and supply of a sort of 'quality certification';
3. a *collective learning process,* mainly through skilled labour mobility within the local labour market, customer-supplier technical and organizational interchange, imitation processes and reverse engineering, exhibition of successful 'climatization' and application to local needs of general purpose technologies, informal 'cafeteria' effects, complementary information and specialized services provision ('*transcoding function*');
4. a *collective process of definition of managerial styles and decision routines,* through managerial labour mobility, imitative decisions, cooperative decision-making through local industrialists' associations, complementary innovation processes ('*selection function*');
5. an *informal process of decision coordination,* through interpersonal linkages (families, clans, clubs, associations), easier and faster information circulation on innovative decision-making, easier financial-industrial linkages, similar cultural background of decision-makers ('*control functions*').
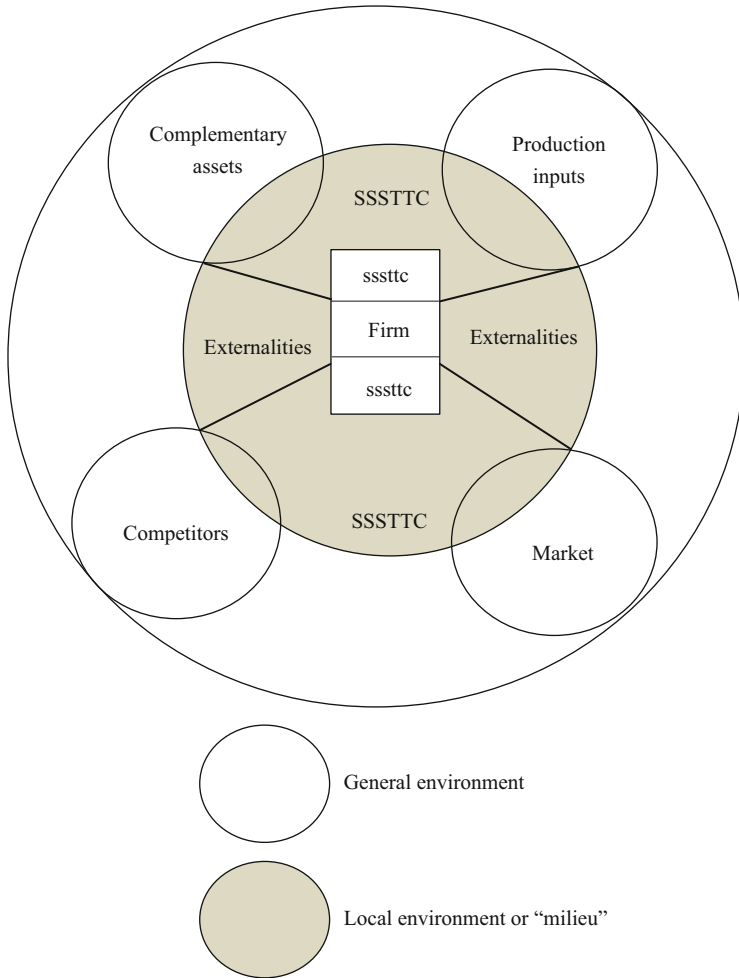
Fig. 4.2 The local and external environment of the firm and their functions in a dynamic setting. SSSTTC = uncertainty—reducing functions performed by the "milieu": search, selection, signaling, transformer, transconding, control, sssttc = uncertainty—reducing functions performed by the firm (same)

Beyond these functions, linked to specific kinds of static and dynamic uncertainty, another important function is performed by the local 'milieu', contributing to enhancing local firms' effectiveness and innovativeness:

6. *a function of conversion of external energies* to the needs of local firms, this function being particularly important in the labour market, human capital and educational sphere: in fact, not only is information decoded and collectively

organized, but also potential energy, as represented by availability of generic production factors, is channelled and trans-formed in order to match with the qualitative claims of actual and potential demand of the local structure ('*transformer function*').

In the abstract neo-classical scheme, all these functions are performed automatically by the market. But, as we have mentioned earlier, many difficulties emerge for the firm, even in a static context, in the form of lack of transparency, the presence of hidden qualities in the products (the market is full of 'lemons', whose characteristics are discovered only after purchase), opportunistic behaviours, imperfect knowledge of the codes and channels by which information may be gathered. In a dynamic context, which is the most important in the context of technology and innovation decisions, these difficulties are amplified, the signalling function of the market becomes weak, and the utilization of routines, the reference to widely accepted beliefs, the effort to control the decision-making process of the other actors becomes an inescapable must for the firm. The local 'milieu' may be considered under this respect as an extension and a specification of an 'organized market', where not just quantities and prices are fixed but also institutions, real actors, languages and codes interact with each other.

Consequently, the definition that may be proposed of the 'milieu' or the local environment is that of a collective operator reducing the degree of static and dynamic uncertainty for the firms by tacitly or explicitly organizing the functional and informational interdependence of local actors and informally performing the SSSTTC functions (search, signalling, selection, transcoding, transformer and control) (Fig. 4.3).

As far as the function of signalling and the parallel formation of accepted 'beliefs' in the case of quality uncertainty or dynamic uncertainty are concerned, it is important to remember that even in mainstream neo-classical models an explicit condition for the existence of an equilibrium solution is the good matching of the two elements (signals and beliefs) (McKenna 1986, Chap. 8). The local milieu, through repeated experience and localized 'memory', performs exactly this function, attributing reliability to signals and spreading the acceptance of a common vision about the state-of-the-world.

From all the preceding arguments it becomes clear that 'proximity matters'; and in fact, it does in a threefold way:

(i) because of the presence of local resources of human capital, that are quasi-immobile with respect to the external territory and highly mobile within the local territory; their presence accounts for much of the local collective learning process and in so far as it contributes in effect to the enhancement of productivity of local firms and to the creation of a local external "image", it cumulatively reinforces itself through polarization effects and attraction of external firms (the example of Silicon Valley is enlightening in this respect; see Gordon 1989a);
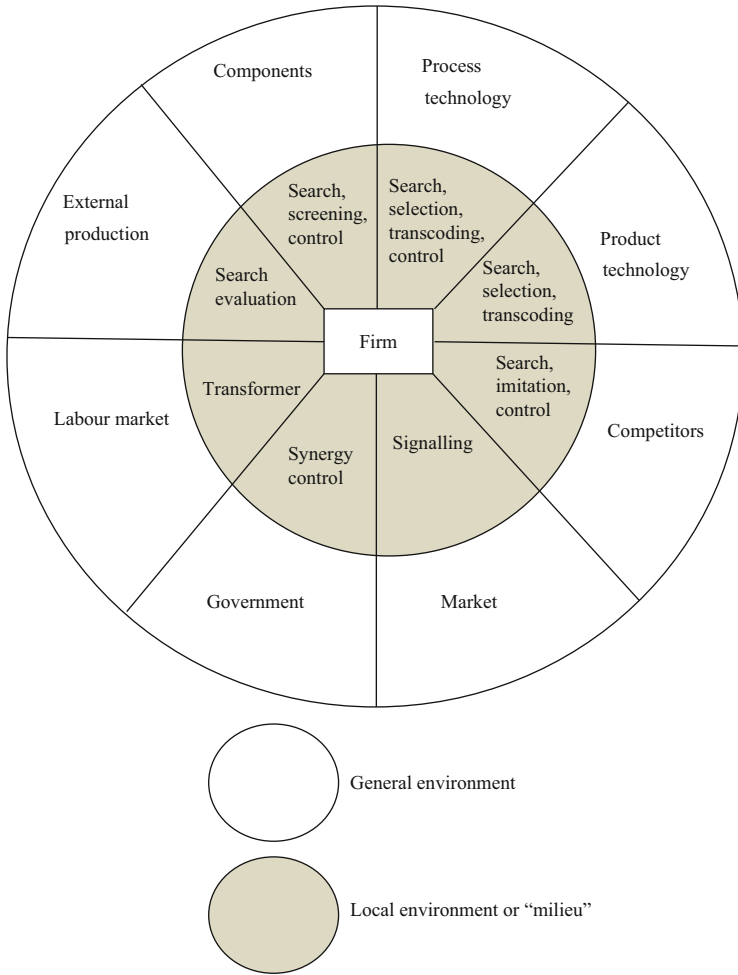
Fig. 4.3 Main uncertainty-reducing functions performed by the 'Milieu'

(ii) because of the presence of an intricate network of mainly informal contacts among local actors, building what Marshall called an 'industrial atmosphere' within industrial 'districts', made up of personal face-to-face encounters, casual information flows, customer-supplier cooperation and the like (see the contributions of Stöhr, Perrin, Quevit, Gordon and Dilts, Camagni in the Gremi publications);

(iii) due to the presence of synergy effects stemming from a common cultural, psychological and often political background, sometimes enhanced by the effectiveness of some local 'collective agent'; the common cultural roots are highly important in that they contribute to the establishment of tacit codes of conduct, to the decoding of complex messages (Lundvall 1988) and to the

formation of common 'representations' and widely shared 'beliefs' on products and technologies (Planque 1983; Crevoisier et al. 1990).

All these territorial and proximity elements explain why innovation creation and diffusion is highly enhanced in those special territories such as big metropolitan areas, industrial districts, 'valleys', 'corridors' and 'parks'. In particular, they explain the very nature of agglomeration economies and their role in the early, information-intensive phases of product life cycles, and in the 'incubation' of small firms which are particularly unarmed with respect to uncertainty. It may be affirmed that if the existence of uncertainty in its multiple forms raises the minimum efficient firm size, the presence of an information-rich and synergetic local 'milieu' performing an uncertainty reducing function allows this efficient size to stay low enough to let small firms survive and prosper.

It is interesting to note that other branches of the social sciences have long since arrived to similar conclusions, even if not taking in direct consideration the territorial aspects of the theoretical problem. In particular, organization theory, organization psychology and strategies choice theory have highlighted the important relationships between the individual actor, the organization and its 'context' in a world characterized by uncertainty (Johannisson 1987). This approach has been used to analyze, *inter alia,* the locational decision-making process of the firm. 'An adequate model for understanding policy making must start with the individual and its many types of *fallibility,* but it must also take into account the *collective* situation in which executives function' (p. 274; our italics).

What is called the 'context of operations' allows the individual to overcome the inescapable presence of (static) uncertainty in the process of gathering and interpreting of information, supplying him both with 'current views of bow situations should be classified' and 'current objectives and appreciation of constraints'. The consequent picture of a dynamic process of interaction and mutual modification of the 'context' and the 'organisation' (a 'system learning process' in Townroe's words) is theoretically similar to the collective learning process taking place in our model within the local *milieu.*

4.5 Networking

4.5.1 Definition

The effectiveness of the local 'milieu' as an uncertainty-reducing operator has its limits, however.

Some of these limits are implicit in the nature of the relationships that constitute the milieu itself. These relationships are mainly informal and tacit relationships, operating better on information circulation and on imitating behaviours than on more direct linkages among economic actors. Therefore, the role of the milieu

becomes weaker when control functions are directly concerned (as can be seen in Fig. 4.1).

Secondly, the behaviour of the milieu, even if it can be considered as the outcome of a collective learning process going far beyond the possibilities of individual firms, is subject to explicit risks of aggregate and generalized decline, especially in the case of very specialized and homogeneous local structures. The crisis of many specialized old industrial areas in the l960s and l970s, bit by sectoral crises (iron and steel, ship-building, textile and motor-vehicle regions in the UK, Belgium, the United States, Germany) and the present crisis of a new success area like Prato in Italy are examples of how local know-how and synergies may be unable to face big dynamic changes in markets or technologies. By the same token, diseconomies of scale and environmental problems may well overcome urbanization advantages in big metropolitan areas in particular historical circumstances.

Therefore, endogenous and exponentially growing locational costs, which may be considered as the opportunity cost of utilization of the 'milieu', and evident limits in the static or dynamic performance of the 'milieu' itself, push towards the creation of a new organizational and behavioural model, a new 'operator' enhancing the control capability of the firm upon its turbulent environment (Boissevain and Mitchell 1973; Johannisson 1987; Kamann and Nijkamp 1988).

This new operator, superior in some respects to the local 'milieu' and the synergies it may develop, and intermediate between (market) competition and (organizational) power, may be found in inter-firm *cooperation;* its specific behavioural model is the 'network firm'. With this new model—occurring through joint ventures, strategic alliances, consortia, technical cooperation, cross-commercialization, licensing and franchising agreements—firms obtain access to important complementary assets, markets and technologies without incurring organizational or locational costs (which are typical of internal growth strategies), and free themselves from the limits of local (and internal) competence. In addition, through this strategy a wider control is acquired on both technological trajectories and competitors' conducts.

In our view, a 'network' may be defined as a closed set of selected and explicit linkages with preferential partners in a firm's space of complementary assets and market relationships, having as a major goal the reduction of static and dynamic uncertainty.

Network relations, of a mainly informal and tacit nature, exist also within the local environment, linking through *open* chains, firms and other local actors as we have seen before. Our proposal is, nevertheless, to use the term 'network' ('réseau') only in the case of explicit linkages among elected partners and to refer to the former as 'milieu' relationships (Fig. 4.4).

At first sight, cooperation and networking on a trans-regional or trans-national basis represent a sound alternative to the exploitation of local synergies and seem to annihilate space in both its geographical and its relational dimension. In fact, 'certaines analyses se réfèrent à la notion de "réseau" pour caractériser une organisation de la circulation entre entreprises de plus en plus affranchie de la matérialité d'une configuration spatiale locale; l'organisation "en réseau" marque le
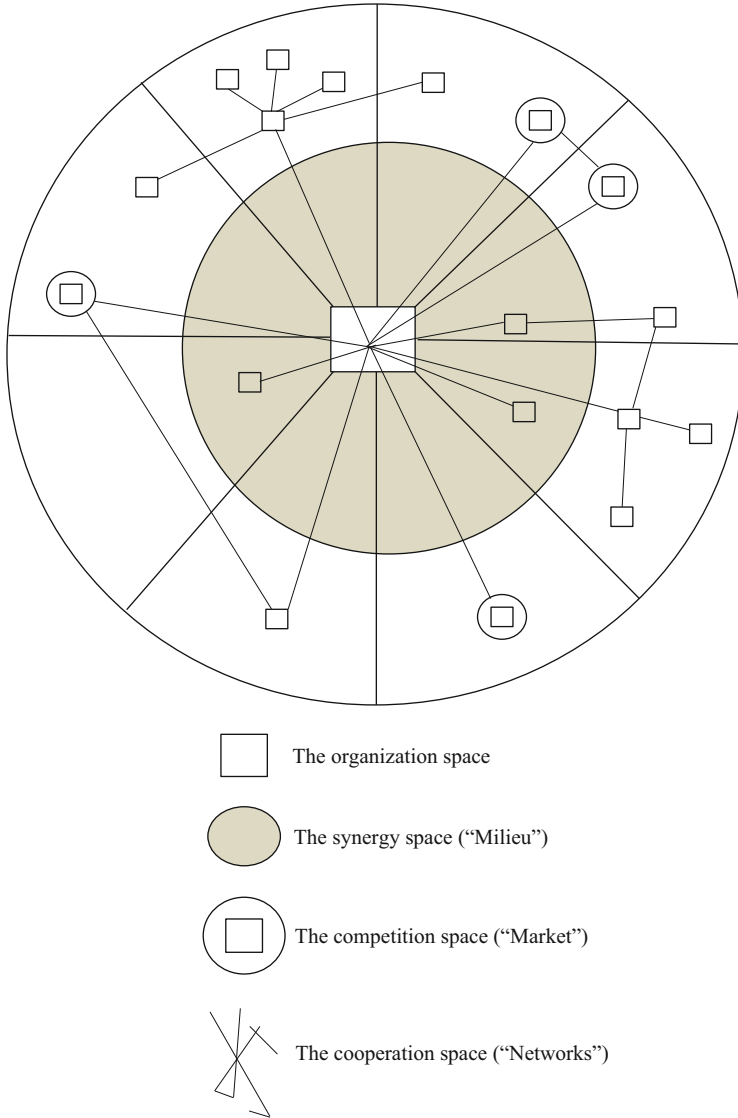
Fig. 4.4 Networking and the external environment of the firm

passage d'un espace de place à un espace de flux, ou encore celui d'un espace topographique à un espace topologique' (Plan Urbain 1989). We will come back to this issue later on.

4.5.2 Relevance

The most important fact at this moment is to recognize the increasing or booming utilization of those new forms of external development by firms of various sizes, particularly in those areas of production characterized by fast innovation and technological change like electronics equipment, telecommunications, semiconductors, software, and factory automation devices; in a word, the 'information technology' sectors. This new empirical evidence has to be considered and included in all theoretical framework addressing the interpretation of technological and spatial development.

Up to now, due to the relative originality and novelty of the process, the relevant and already rich literature has mainly been addressed towards field inquiries or descriptive and taxonomic reflections (among the most recent: Foresti 1986; OECD 1986; Vickery 1988; Chesnais 1988; Camagni and Gambarotto 1988). The main conclusion of the fertile debate may be summarized in this way:

– cooperation agreements represent new forms of international competition, intermediate between market resort and hierarchy, taking place within oligopolistic sectoral structures;
– they are specific to a context characterized by the emergence of a new technological '*paradigm*', that of the information technologies, featuring *pervasiveness, technology convergence* and fast innovation processes;
– they have as final objectives the traditional ones of *profitability* and *market power,* to be gained through:
    – synergies and economies of scale in production, marketing and R&D;
    – scope economies and product differentiation;
    – cross fertilization and development of technological complementarities;
    – the increase of a fast-reaction capability to external shocks;
    – the control over those innovation assets that define future application patterns of information technologies;
    – the formation of new kinds of entry barriers (proprietary standards).

The possibility of incorporating the new 'network' behaviour in established economic models depends on the nature of the goals pursued by the firm. In this respect, we may distinguish three broad categories of goals:

(A) the first category encompasses the goals of achieving *scale and scope economies,* through the merging of R&D facilities and resources, distribution channels and variety of products. This is the more traditional behaviour, easily interpreted in terms of standard microeconomic theory. Networking and strategic alliances in this case prove superior with respect to traditional behaviours such as equity participation and mergers in that they allow limited cooperation in well-defined fields or 'partial merging', leaving aside the possibility of competition in other fields (this element is important in the case of big conglomerate and multi-division firms).

(B) A second and more important category of goals regards the stable utilization of complementary assets, the control of specific technologies and market channels, *avoiding the costs of search, screening and decoding* complex information and the uncertainty elements involved. Thus, we are back to the first three kinds of static uncertainty defined earlier, and we are therefore able to include networking and cooperation agreements within the same theory of evolutionary firm behaviour.

The new behavioural model overcomes the high use-cost of the market, or the high transaction costs which are caused by the presence of market imperfections and episodes of market failure; transaction costs may in fact be defined as 'the opportunity costs of any localized inefficiency in prices to deliver correct signals' (Antonelli 1987a). In addition, the presence of important 'intangible assets' stemming from long internal learning processes prevents any localized technical progress from being easily transferred by means of simple market transactions (Camagni 1989) and calls for closer cooperation between the donor and the accepting firm.

Cooperation may be considered as imposing itself as the most efficient firm conduct with respect to market resort or internal development at high levels of transaction costs and organizational costs (Fig. 4.5). A third element to be considered in this picture is the appropriation regime of the technology concerned, in that a tighter appropriation condition, stemming from intrinsic complexity or from the presence of institutional barriers like patents, may emphasize the case for direct cooperation.

(C) The third category of goals are the most interesting ones: they regard the dynamic behaviour of the firm directly and confer the cooperation agreement a true nature of 'strategic' alliance. Here the objective is not just the control over a given technology or a given stock of complementary assets, but rather *the control over the optimal development trajectory of these assets or technologies*. The agreement regards products which do not yet exist, and it seeks to control the processes that are considered as crucial for their conception and attainment.

It is evident that in such a new context, which fits perfectly with the original and innovative characteristics of cooperation agreements and network behaviour, theories based on static efficiency and also transaction-cost approaches seem completely useless. Future profits stem from a series of strategic decisions, oriented to fast-reaction and continuous innovation, to the early pre-emption of newly discovered market niches, to an aggressive marketing policy in order to discourage potential competitors. All these decisions are projected in a dynamic framework, incompatible with merely static approaches of allocative efficiency: markets (which do not yet exist) and (routine-oriented) organizations are intrinsically unable to produce the right signals on prices and the right standards for costs.

Low   Appropriability régime   High

Internal R&D
Imitation
Reverse engineering   Internal R&D   Cooperation

Cooperation

Market transaction   Market transaction

Time/cost of autonomous development   Time/cost of autonomous development
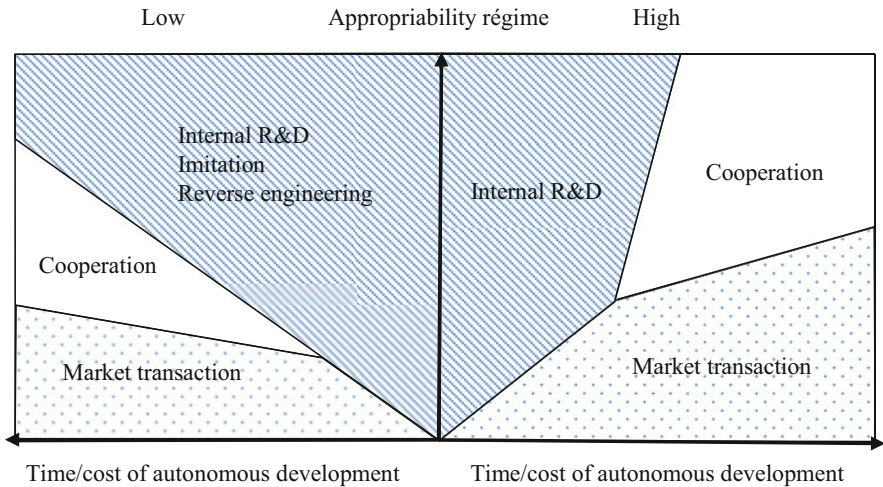
Fig. 4.5 Alternative firm strategies in technology acquisition. Source: Adapted from an idea by Teece and Pisano (1987)

On the contrary, the theoretical areas which it would be useful to address seem to be the analysis of strategic competition, negotiation theory and the theory of cooperative and non-cooperative games (Raiffa 1982; Jacquemin 1987). In fact, the concept emerging from this view is that of 'strategist firms that by force or by bluff try to control in a dynamic process their rivals and their environment to their own advantage. They calculate, anticipate, and invest in irreversible capital, thus segmenting markets, increasing their rivals' costs, tying up their suppliers and their clients, and manipulating information' (Jacquemin 1987, pp. 123–124).

We are now back to the second type of uncertainty defined earlier, namely dynamic uncertainty, not just created but explicitly enhanced by the decentralized decisions of independent actors. Under these conditions, cooperation may stem tacitly from collusive behaviours (as in the prisoner's dilemma with repeated games: history and memory are once again important!) or derive from the explicit choice of the firm, trying to reduce the complexity of its decision parameters and to enhance the control on some of its supposedly strategic assets (and on their time trajectory).

4.5.3 Collective Operators

A fourth behaviour space (and a fourth operator) is therefore at the firm's disposal, beyond the *organization space* (growth by internal development and acquisitions), the *competition space* (market transactions), and the *synergy space* (the local 'milieu'): we have called it the *cooperation space* and 'networking' represents its related behavioural model (Fig. 4.4).

Two problems will be faced hereafter which may derive from the theoretical scheme hitherto presented: the relationships between the two new 'operators', namely the 'milieu' and network cooperation, and the difference between our approach and the transaction-cost approach applied to territorial analysis.

As can be seen in Fig. 4.4, 'milieu' relationships and network relationships appear as complementary and mutually reinforcing 'operators', the former linking the firm to its contiguous environment through mainly informal, tacit (and often even overlooked and apparently unappreciated) relationships, the latter linking it explicitly to selected partners in its operational environment.

Both operators bring an element of 'socialization' into the picture of economic behaviour stemming both from the collective learning process, happening at the local scale, and from the cooperation nature of network linkages: 'innovation does not emerge from the singular efforts of entrepreneurial firms or corporate research centers, for the contributions of individual actors are themselves produced within linkage networks that are collective in character and retain a critical territorial dimension' (Gordon 1989a). Firms' networks work as a sort of 'collective participation' to the process of appropriation of quasi-rents and innovation profits stemming from the cooperative behaviour (Allen 1983; Antonelli 1987b). The explicit nature of network and cooperation linkages may, at first glance, obscure the importance of local relationships and leave the researcher with the impression of a collapse of the concept of space, both in its geographical and relational meaning, into that of trans-territorial networking. On the contrary, the two concepts and related 'operators' are deeply interlinked and complementary.

On the one hand, the 'milieu' has to open up to external energy in order to avoid 'entropic death' and a decline in its own innovative capability; firm networks seem the most important instruments (but hardly the only ones) to cope with the problem. On the other band, when choosing a partner to link up with, not only does the firm choose a single partner, but also a 'collective' one (speaking allusively), at the same time linking itself with a 'local' culture and acquiring partial access to the synergies of its 'milieu'. A link-up with a firm located in Silicon Valley is more a link with the Valley itself than with a special firm, with which, if otherwise located, no agreement would probably be made.

Sometimes, for example, in the Third Italy or once again in Silicon Valley, the territorial specificities are so profound and crucial for the process of innovation and technical change that it might be rightly claimed that 'firms tend to be relatively contingent manifestations of technical projects developed in the region's professional culture' (Gordon 1989a).

Will these new territorial and trans-territorial relationships be properly analyzed through the concepts of the Williamsonian Institutionalist School, and in particular, through the transaction-cost approach? As we have seen before, many of these concepts were in fact utilized in the preceding theoretical framework and recently some interesting works have considered agglomeration economies showing up in industrial 'districts' and urban areas as the outcome of transaction cost-reducing processes (Lambooy 1986; Scott and Angel 1987; Cappellin 1988).

The transaction-cost approach and the approach proposed here are, in fact, similar in some respects in that both point out the role of information and information gathering costs in determining allocative efficiency, and give spatial proximity (or networking) the role of reducing these later costs. Nevertheless, in spite of the fact that information represents the bridge between static and dynamic behaviours, the transaction-cost approach remains basically a static one, addressing itself more to problems of allocative efficiency and design of organizational structures than to problems of dynamic efficiency and innovative behaviour. Through the related concepts, static but not dynamic uncertainty may be understood.

In fact, between the two general operators of market and hierarchy, there lies the possibility of inserting a third one, cooperation, using the same Williamsonian general framework. However, in this case only the more traditional firm behaviours and goals may be grasped, those pertaining to complementary assets control. In contrast, the true dynamic objectives of 'strategic alliances' and their innovation enhancing role remain obscure in this context (Gordon 1989b; Camagni 1989). Furthermore, with respect to the general uncertainty-reducing role of the 'milieu', a transaction-cost-reduction hypothesis seems rather limiting and prevents us from truly incorporating spatial variables into an evolutionary theory of innovation and technical change.

4.6 From the Firm Space to the Technology Space

The problem now is how to model the previous relationships in explicit dynamic terms, passing from the space of single firms deciding upon innovation, to the space of competing and evolving technologies. In a word, passing from a (micro-economic) adoption perspective to a mesa-economic perspective of technological diffusion.

Two main theoretical approaches may be followed, while still remaining within the context of ecological-evolutionary models:

(A) an approach which, once again drawing from the biological analogy, we may call a *selection approach,* looking at the competition between mutually exclusive technologies and their '*substitution*' in space; and

(B) an approach which we may call *a mutation approach,* looking mainly at problems of true *technological creation* within the context of development and diffusion.

The alternative stems from a mainly theoretical consideration of the nature of the technological evolutionary process: a process of competition between species or between already known technologies on the one band, and a process of mutation and technology 'creation' along a trajectory of evolving (vintage) techniques as well as through changes of trajectories. From a modeling point of view this difference blurs a little because potential advancements in technology have to be,

in one way or another, pre-defined into the space of the possible outcomes of the evolutionary process.

The first category encompasses mainly (but not exclusively) deterministic models considering and simulating a process of dynamic 'adjustment to an equilibrium condition where the most profitable technology completely replaces the competing ones. The second category encompasses mainly stochastic models of search and innovation creation, building mainly on a self-organization approach and on the consideration of collective learning and cooperation processes.

It is important to say that an explicit consideration of space and spatial relationships is still lacking in the relevant literature, as a sort of trade-off seems to exist between the inclusion of spatial variables and the explicit consideration of evolutionary processes. Simplifying assumptions are therefore generally adopted in spatial models which limit their heuristic capability.

4.6.1 Selection Models

In Table 4.2 a taxonomy of historical approaches to technological diffusion is presented according to the two dimensions previously proposed.

The main concern of non-orthodox models of technological selection is to explain the existence and causes of the lag structure of adoptions. At the firm level, the most comprehensive analysis of the process is made by Scherer (1980), introducing the variability among firms in the two variables determining the adoption (and the adoption time): *relative profitability* of the new technology (depending on factor price differences among firms, the depreciation share of the existing equipment, etc.) and *adjustment costs* from the old to the new technical structure (here, inter-firm differences come from R&D commitment, internal labor relations in case of labor-saving technologies, managerial capability in handling the organizational aspects of change).

In determining the right timing for adoption, firms have to consider both the extra costs of an anticipated adoption and the profits which may come from market niches completion and early adopter strategy (Scherer 1980, p. 427; Cappellin 1985).

Recently, an interesting insight into the problem of understanding the causes of the slow pace of technological adoptions of advanced and profitable technologies came from Heiner's works (1988a; b). Even in a world of perfect information and no adjustment costs, if there exists what we previously called C-D uncertainty (a gap between competence and decision) and consequently the possibility of decision errors, the 'optimal' strategy for the firm will be one of imperfect, delayed and sluggish adjustment to changing external technological possibilities.

At the 'meso' level of the diffusion of competing technologies and their mutual substitution, the main approaches through which the process has been modeled may be sketched as follows:

Table 4.2 Some ecological–evolutionary models of technological development

	Dimensions		
Approaches	Firm (adpotion)	Technology (diffusion)	Space (spatial diffusion)
Selection models (technology substitution)	Adoption of a new technology: (a) Presence of adjustment costs (Scherer 1980) (b) Presence of imperfect decisions and expectations Heiner (1988a, b)	Competition between known technologies (a) Profitability Gibbons and Metcalfe (1989), Iwai (1984) (b) Adopters heterogeneity and perfect information David (1975), Davies (1979) (c) Information exchange between technologies Sonis (1986) (d) Dynamic learning Metcalfe (1981), Camagni (1985)	(a) The firm level Cappellin (1985) (b) The single technology level Hagerstrand (1967), Camagni (1985), Capello (1988)
Mutation models (technology creation)	Evolutionary models (a) Search and decision-making models Nelson and Winter (1982)	Self-organisation models (a) Stochastic models of technology evolution Jimenez Montano and Ebeling (1980), Silverberg et al. (1988)	Urban self-organisation models (a) Urban innovation Camagni et al. (1986: Soudy 1) (b) Urban synergies Camagni and Diappi (1991: Soudy 3)

– deterministic adjustment models where *relative profitability* is the central element for convergence towards the best technology: this process may stem from the simple reinvestment in the same technology of the higher profits it allows or come from investment shifts from technology i to j, according to higher relative profitability of technology j and to its market share (acting as an information element) (Iwai 1984);

– equilibrium adjustment models with *adopters heterogeneity* and instant-perfect information: reaction characteristics among the potential adopters may come from size and efficiency diversities (David 1975) or be stochastically distributed as in probit models (Davies 1979);

– dynamic models of *information interaction* between technologies; in the most advanced model of this family (Sonis 1986) the time variation of the relative market shares of different competing technologies is linked to the interaction of an anti-symmetrical 'competition' matrix A presenting the values of an iterated game among technologies (the effects of the adoption of technology i on j with an 'information' matrix M presenting the information which originate from the adoption of i and go to j). The substitution curves generated by this interaction are proved to be generalized logistics, and from their empirical estimation in simplified cases, an estimation of the two matrices is made possible. Particularly interesting is the fact that the superior technology (gaining in the competitive game) defines the asymptotic shares of all technologies through the information

it releases on them (Colla and Leonardi 1984). Differently from 'mutation' models, matrices A and M, and consequently also the characteristics of the competing technologies in time, are assumed as constant;

– dynamic models where endogenously determined variations in the price of *the new technology* and *learning processes* of their adopters determine a shift in the size of its adoption potential (Metcalfe 1981) or where this potential more simply evolves through a logistic expansion of the number of sectors or firm size classes interested by the technology (Camagni 1985).

All these models bear only an implicit spatial dimension. When this dimension is made explicit, as in the well-known Hägerstrand model (1967), the simplified assumption of equal contact probability of all actors, underlying all epidemic diffusion models, is made. This assumption highly reduces the coherence of this approach: a spatial context is in fact characterized by the opposite condition of differentiated profitability, adjustment costs and willingness to accept risks. A possible escape from this problem could be that of fitting single models in different but homogeneous regional spaces, and to interpret lag and diffusion speed parameters in a second step on a cross-regional base (Camagni 1985; Capello 1988).

4.6.2 Mutation Models

More recently the element of technology evolution and technology 'creation' along the diffusion path has been taken into full account through stochastic models incorporating Schumpeterian innovation. The technological frontier evolves in time in a way that is only imperfectly anticipated by firms.

Still from Table 4.2 we see that in this case the natural quotation as far as the behaviour of the single firm is concerned, is the work by Nelson and Winter (1982, Chap. 9) on *evolutionary search behaviours*. Here the firms, dissatisfied with actual profit levels, may enter a process either of imitation of existing external technologies or a process of search on a metric space of potential technologies (ordered in terms of distance with respect to the present know-how of the firm).

Dynamic self-organization models have enlarged the view from the firm space to the technology space. A 'master equation' approach, defining the change in the probability of finding a specific distribution of technologies at a given time, may give us the evolution of the entire spectrum of actual and potential technologies, starting from the individual transition probabilities of technology imitation, improvement, creation (Jimenez Montano and Ebeling 1980; Silverberg 1988). Perhaps the most advanced attempt in this direction is the Silverberg, Dosi, Orsenigo self-organization model (1989) in which transition probabilities are modeled carefully in terms of both the choice of a particular vintage within a specific technological trajectory and the change of trajectory happening at certain points in time. These changes are a function of the evolution of the internal know-how and of an external 'public' skill made available to all actors.

The inclusion of spatial and collective learning processes allowing an easier innovation decision could easily be introduced in the model, allowing the transition probabilities to be influenced by the decisions taken in previous times by surrounding firms.

In a different context, one of interurban competition for innovating functions, a similar kind of self-organization model was presented some years ago (Camagni et al. 1986) where a master equation controls for the transition probabilities from a set of urban functions to an upgraded one, and urban size represents the control function in the same way as firm productivity does in the preceding models.

A further refinement of this model in the same logic was presented recently, allowing spatial synerg1es to explicitly affect the innovation probabilities of each area (Camagni and Diappi 1991). Synergies may come from vertical, 'filière-type' integration or from horizontal interaction among similar productions, two elements that represent an early quantitative treatment of the spatial relationships which produce an innovative 'milieu'.

4.7   Conclusions

'*Technological progress is in the first instance the reduction in uncertainty*. The product of a research and development effort is an observation on the world which reduces its possible range of variation' (Arrow 1969). Nobody could have stated in a more concise and effective way the central role that uncertainty plays in any theory of technical change.

The main point made in this paper is that the inescapable presence of static and dynamic uncertainty in any dynamic model of economic behavior calls for the development of specific 'operators' that, well beyond pure market and hierarchy, may limit its paralyzing impact on firms dynamic behavior, complement the imperfect signaling function of the price system, organize a viable learning process for both individual firms and society and enhance their creativity potentials.

Two important 'operators' of this kind are found, on the one hand, in the local 'milieu' or the 'synergy space' that it potentially represents, and on the other hand, in the 'cooperation space' and the possibility of trans territorial network linkages between firms. Both these operators act as uncertainty-reducing devices, performing the functions of information searching and screening, signaling, transcoding of complex messages, selecting appropriate decision routines and controlling other actors' economic conduct, in a collective and socialized way.

The territoriality of the first operator is apparent, as proximity plays a necessary (but not sufficient!) role in the creation of local synergies. The second operator, that apparently departs from a strict territoriality, in fact also bears a territorial nature: in fact, the assets firms bring into the network agreement are often the outcome of a complex local culture and of localized social learning processes.

Therefore, on the one hand, territorial relationships and the local 'milieu' emerge as necessary and crucial elements in the innovation process; on the other hand, a proper vision of the evolutionary process of technology creation has led us

towards the construction of a new, intrinsically dynamic interpretation of economic space. From a modeling point of view, dynamic self-organization models seem to be the most apt in incorporating the new approach and its related concepts into an operational and coherent mathematical framework.

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On the Concept of Territorial Competitiveness: Sound or Misleading?

Roberto Camagni

5.1 Introduction

In an era of globalisation, the issue of territorial competitiveness is of increasingly central importance for regional development policies. This paper aims to deal directly with the issue from a theoretical viewpoint, in particular examining two related questions more thoroughly: the question of the soundness of the concept of territorial competitiveness itself in terms of economic theory and the question of the new foundations on which this competitiveness is based, using a cognitive-evolutionary type approach.

I feel this to a large extent as a counter-argument, due to the fact that the concept of competitiveness, referring to the national level, has been strongly challenged by a well-known authority on international economics, Paul Krugman (1998), who has been dedicating an increasing amount of attention to the issue of spatial development. His sceptical and provocative comments have perplexed experts in the field of regional economics as to their validity in more restricted contexts than the national context (International Regional Science Review 1996; Urban Studies 1999) but they have never been explicitly and analytically evaluated in a critical way; so it appears right to state that the theoretical legitimacy of the concept still remains uncertain.

The argument proposed here asserts that the concept of territorial competitiveness is theoretically sound, considering not only the role that the territory plays in providing competitive "environmental" tools to individual companies, but

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especially the role that it plays in the processes of knowledge accumulation and in the development of interpretative codes, models of co-operation and decisions on which the innovative progress of local companies is based. In particular, a primary role is played by processes of "collective learning" (Camagni 1991a; Capello 1999; Keeble and Wilkinson 1999): these processes result in a "socialised" growth of knowledge, which is embedded not only in the internal culture of individual companies but, particularly, in the local labour market (or, as used to be said in the past, in the local industrial atmosphere).

This conclusion is supported by different aspects of the economic concept of "territory". It is at the same time:

- a system of localised technological externalities, i.e. an ensemble of material and immaterial factors which, thanks to proximity and the resulting reduction in transaction costs involved, can also become pecuniary externalities;
- a system of economic and social relations, which make up the *relational capital* (Camagni 1999) or the *social capital* (Putnam 1993; World Bank 2001) of a certain geographic space; and
- a system of local *governance*, which brings together a collectivity, an ensemble of private actors and a system of local public administrations.

The second argument proposed regards the fact that some laws that govern the economics of inter-national trade do not operate at the sub-national level, and this once again makes the concept of territorial competitiveness relevant. I refer in particular to the Ricardian principle of comparative advantage, which assigns a role to every country in the international division of labour, whatever may be the level of efficiency and of competitiveness of its productive sectors. I maintain, however, that at the more finely detailed territorial level—and therefore in economies open not only to trade but also to the movement of factors—the principle that governs production, specialisation and trade is an absolute advantage principle; if a certain level or rate of growth in competitiveness is not assured, the fate of that economy may be crisis, depopulation and desertification.

Therefore, it does not seem unreasonable to claim that territories compete with one another, both to attract direct foreign (or external) investment and in defining a productive role for themselves within the international division of labour, without any automatic assurance of such a role. Both attractiveness and local competitiveness depend on similar common factors, which are not only found in physical externalities, accessibility or environmental quality, but also in relational capital and the learning capacity expressed by the territory. It is obvious that individual companies are the entities that compete and act in the international market, and that their innovativeness can never be separated from the presence of a Schumpeterian entrepreneur; but these companies and these entrepreneurs are to a large extent generated by the local context and, in order for them to govern and live with uncertainty, their decision making processes are firmly based on socialised processes and/or explicit collective action.

5.2   Globalisation and Localisation

This theoretical reflection is strictly tied with the debate on the spatial effects of the globalisation process, intended as the increasing planetary integration of markets for goods and services, markets of such production factors as technologies and information and markets of location sites for economic activities (Scott 2001; Camagni 2001a).

In this field, two opposite and extreme positions confront each other. On the one side, the pessimistic one, merging (and sometimes adding up) different and disparate concerns, from the survival of local cultures to the fear about the economic and political power of multinational corporations, from the possibility of environmental dumping to the challenge of emerging countries to employment levels in rich countries. On the other side, the optimistic, "don't worry" position, claiming that open markets have sufficient self-adjusting mechanisms to ensure local wellbeing and that the law of comparative advantage will assure each country a role in the international division of labour, no matter which could be its international competitiveness.

On the political side, what has been called "localisation", namely "the growing desire of people for a greater say in their government" (World Bank 1999) through higher levels and effective ways of participation in decision-making (OECD 1999a) derives exactly from a growing feeling of insecurity by citizens about the capability of governments to take care of them and rightly interpret their needs. In fact, globalisation hits in many respects their lives, destroying the shelters once provided by physical space (local captive markets), by local specificities (consumption and production habits), local organisational models, "patriotism" of local firms. On the other hand, national governments increasingly give up policy tools that in the past proved effective, from monetary policies (attributed to supra-national authorities, managing wide—optimal?—currency areas), to fiscal policies (due to tight budget constraints), from exchange rate policies (in monetary unions) to many industrial policies (replaced by common supra-national regulations and trade agreements). Concerns are real, at least because they in fact exist, and are rational under many respects, as it will be shown later in the paper; demands for greater participation and regional federalism are also perfectly correct, the danger residing in possible policy outcomes totally oriented towards defensive attitudes, separatism and closure—the regional equivalent of national protectionism.

On the purely economic side, one may judge opportunities and threats generated by globalisation as equivalent, balanced and therefore neutral in terms of spatial effects. But this judgement changes radically if one considers some new, qualitative aspects of the present international economic picture: the increasing importance of knowledge factors, of immaterial elements linked to culture, taste and creativity in present economic processes and the characteristics of what could be called the production function of these elements and the ways of their accumulation. In fact, these immaterial elements develop through slow learning processes, fed with information, interaction, long term investments in research and education (Amin and Wilkinson 1999; Keeble and Wilkinson 2000). Like all learning processes, they

are inherently localised and cumulative, as they embed in human capital, interpersonal networks, specialised and highly skilled local labour markets and local innovative *milieux* (Camagni 1991b; Lundvall and Johnson 1994; Asheim 1996).

When analysed in an international perspective, technical progress ceases to be a public good, perfectly mobile and accessible to everybody; on the contrary, it circulates rapidly only inside some restricted networks, as it requires high quality immaterial assets in order to be properly adopted and its profits appropriated (Savy and Veltz 1995, Introduction). "While firms can access an increasing stock of codified knowledge, they require greater investments in tacit knowledge, such as human capital, management and organisation, to derive tangible benefits from technological change and innovation. (...) Firms may now benefit less from imitation and 'free' technology spillovers, as they require substantial investments in innovation and in co-operation and networking to access the stock of global knowledge" (OECD 1999b, p. 3).

We see here a complex dialectics and confrontation between the hyper-mobility of some production factors and the territorial "anchorage" of some others, which act as crucial location factors for the more advanced production processes. The likely result is the cumulative strengthening of the centripetal forces of growth (scale and scope economies, all sorts of increasing returns) and the centrifugal forces of territorial exclusion and decline. It is perfectly true that technologies and capital goods may be marketed and utilised almost everywhere (better: they *have* to be used everywhere, as they impose internationally shared standards in product and process quality) and that telecommunication networks and facilities are (more or less) ubiquitous, but the skills and relational capital required for their proper or innovative use are by no means available everywhere (Graham 1999).

Endowment with human, social and relational capital emerge as the sources of the competitiveness of territories, necessary preconditions to secure employment stability, benefits from external integration, continuing growth of local wellbeing and wealth. But a number of theoretical and operational problems stem from this issue:

– the actual necessity and usefulness of competitiveness policies;
– the possible targets and tools of such policies;
– the possible emergence of zero-sum games and beggar-my-neighbour attitudes among territories.

5.3   Territorial Competitiveness: "Obsession" or Sound Concern?

For sure globalisation is raising the competitive climate within which firms are confronting each other. This is likely to cause important shake-ups in industries and on territories, as strong selection processes are being launched, jeopardising existing and long lasting equilibria (both in industries, in terms of firm structure, and on territories, in terms of firm/society relationships). Does this allow us to

affirm that territories do actually compete with each other, trying to attract new firms or helping existing ones to stand transformations in the general economic environment, to survive and prosper? Are we allowed to think, in development policy terms, about enhancing competitiveness of territories?

On this subject, an important debate has been carried out in the last half-decade, thanks to the provocative argument put forward by Paul Krugman, a debate which was started considering the case of nations, but recently enlarged to regional and territorial entities.[1] Given the wide differentiation in scientific backgrounds, logics and languages of the participants (international economists, business administration experts, regional scientists) no surprise if the result of that debate was, in my opinion, strikingly inconclusive, the different arguments being often added and juxtaposed, never really confuted, the different territorial levels being always mixed up, as if the same economic "laws" could apply equally for cities, regions and nations.[2]

The question at stake is not at all abstract and removed from present issues concerning spatial development: from the answer to it derives the economic rationale for development policies at the local level, addressed to enhancing competitiveness and attractiveness of territories, their capability of meeting the demand of both citizens and firms in terms of wellbeing and general efficiency.

I believe consequently that a thorough reflection is worth, underlining the good things following from each position, but considering the entire issue through a unique and sound theoretical framework.

Krugman's provocative view is widely known. He contests the growing "obsession" with international competitiveness, denying, on both theoretical and empirical grounds, that "a country's economic fortunes are largely determined by its success on world markets" (Krugman 1998, p. 5). He holds that:

– "countries do not compete with each other the way corporations do"; they "do not go out of business" (p. 6);
– "while they sell products that compete with each other, are also each other's main export markets and each other's main supplier of useful imports" (p. 9);
– the main role of exports is to provide the means to pay for imports, which represent the true element that enhances local wellbeing as it allows the availability of goods at lower prices with respect to local production;
– following Ricardo's textbook model in international trade theory, "a country will always find a range of goods in which it has a 'comparative advantage', even if there are no goods in which it has an 'absolute advantage'" (ibid., p. 91).

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[1]This last part of the debate was hosted by the International Regional Science Review, no. 1–2 (1996) and by Urban Studies, no. 5–6 (1999). Krugman has recently collected his interventions on the subject in (Krugman 1998).

[2]The editors of the Urban Studies issue affirm: "It will be clear that the authors contributing to this Review broadly believe that cities and other places compete with one another. (...) The consequences for national economies remain uncertain" (Lever and Turok 1999, p. 792).

Therefore, he argues, not only the competitiveness goal proves "flatly wrong", but also "dangerously misleading", as, whenever national authorities try to intervene in affecting the competitive advantage of their territories, they end up with a sort of neo-mercantilism, detrimental to the fair allocation of resources which should be based on objective elements, neutrally evaluated by the market. The traditional "infant industry" argument for justifying (temporary) protectionist policies and the more modern "strategic trade policies", which justify export subsidies and temporary tariffs in order to let local industries "create their own comparative advantage, through a process of positive feed back", including increasing returns and external economies (technological and pecuniary) (ibid., pp. 96–97), are considered and accepted, as parts themselves of Krugman's recent contribution to the new trade theory, but with "strong warning against overuse" (p. 99).

I will take up these and others among Krugman's arguments, underlining what is acceptable and fruitful in the construction of a theoretically sound development strategy for territories and what is not.

The theoretical situation is filled with paradoxes, which partly depend on the viewpoint adopted (macroeconomic or microeconomic, static or dynamic), partly on the assumptions and hypotheses of the theoretical reference models (for example: full employment or non-full employment), partly on the complexity and multidimensionality of the concept of competitiveness itself.[3] Consider, for example, the most striking paradox: competitiveness in a macroeconomic statistical sense is measured by the ratio between the general level of import prices and the level of export prices expressed in a common currency; competitiveness therefore increases when the denominator is reduced (due to a devaluation or a reduction in export prices) and tends to generate growth in exports (in volume) and employment. But when you wish to measure the advantage of international trade for a country in terms of real income, you observe the opposite relationship (export prices on import prices), i.e. the *terms-of-trade* and in this case a reduction of export prices, and therefore an increase in competitiveness, result in a reduction of welfare.[4]

However, the paradox can be resolved by turning to a different measure of competitiveness: if it is true that "it is better to sell with prices rising rather than

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[3]When a full employment situation is assumed—resulting from flexibility in prices and wages—as in the classical Ricardian model or in neo-classical models, or when outmigration is considered as a beneficial re-equilibrium mechanism, as in neoclassical regional models, the main attention is paid to per-capita income levels, and therefore the favorable effects of imports on real income are underlined and devaluations opposed. When the possibility of non-full employment equilibria is considered and outmigration is considered as an economic and social cost, as in the models of broadly Keynesian inspiration, attention is paid to income and employment growth, to the elements of aggregate demand and therefore the beneficial role of exports is emphasized.

[4]Even at the time of Stuart Mill the paradox called "impoverishing development" was well-known: if, due to overall development or the development of certain export sectors, economies of scale are achieved and therefore export prices fall (improving "competitiveness"), the terms of trade worsen and, under certain conditions, the country could see its real income fall instead of rise (while its trading partners would benefit from its price falls).

falling" and that the problem consists in dealing with the expected fall in demand in a situation of rising prices, the answer, both conceptual and operative, is of increasing the attractiveness of local products by taking action on innovation, thereby breaking the static context, both conceptual and operative, of price competition. We thus come up against a concept of *non-price competitiveness*, which I shall refer to in the following pages.

I will order my critical reflections in increasing order of importance, holding a spatial perspective, both inter-national and intra-national.

a. Krugman rightly shows us that the true purpose of trade is imports, not exports. Exports are a cost, the way of financing cheap imports, "which is worth doing because it is more efficient than producing our imports for ourselves" (Krugman 1996, p. 19). Spatial division of labor—including the most spectacular, between city and countryside—is based exactly on this principle, which allows each partner to fully exploit the benefits of specialization (from static scale economies to dynamic learning economies), increasing its own and each other's level of wellbeing. But the *terms-of-trade*, the relative prices at which goods are exchanged, is highly relevant for each partner: increasing the efficiency of the export sector means being able to import the same amount of goods employing a lower quantity of local resources (it is mainly the case of process innovation),[5] or to import more with equal utilization of local resources (it is the case of product innovation, product differentiation, etc.). Efficiency of the export sector, or competitiveness, maintains therefore some meaning. Is this a mercantilist attitude? Yes, in the positive, historical meaning of the term. Is this a zero-sum game? No, as a part of the increase in efficiency will result in a decrease of export prices (depending on the degree of competition in the sectors involved), and will go consequently to the advantage of the trade partners.

b. Krugman rightly reminds us that one of the main constituents of local welfare is represented by the efficiency of the "residential" sector, producing goods and services for the domestic market. This is particularly true in a country like the U. S., in which exports represent about 10% of GDP. Therefore, internal productivity makes the difference, not external competitiveness. All this sounds right, but the relevance of domestic productivity for local welfare depends crucially on the size of the country and on its openness to international trade. Taking the example of a small country, like an island specialized in fishing or tourism, the competitiveness of the export sectors determines the employment level, total income level and consequently the amount of real local consumption, almost totally dependent on imports.[6] European countries are 3–6 times more open to

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[5]Provided that export prices, which are defined on the whole international market, remain unaffected.

[6]This argument is similar to the one exposed by Thirlwall in a wellknown article (Thirlwall 1980, p. 422), where he claims that "export demand is a vital element in regional demand, (...) necessary to compensate for a region's appetite for imports, in the absence of other compensating expenditure".

international trade than the U.S.; most firms sell both on the internal and the international market; many apparently "residential" sectors, like retail trade or hotels, sell their services also on the international tourist market. This is why in these countries the two concepts of internal productivity and external competitiveness, which Krugman rightly keeps separate, sound much more similar. Furthermore, coming down to the intra-national, regional level, the share of external trade increases rapidly, and the efficiency of the exposed sectors widely determine employment opportunities and economic welfare of local communities (this argument will be touched on again later).

c. Krugman warns us against a fast acceptance of the policy implications of the "strategic trade theory", to which he himself gave relevant contributions. In a world of increasing returns (at the firm level and at the level of the local *milieu*), where history, chance, accident and policy intervention explain international specialization and trade patterns better than factor proportions or the attributes and inherent differences of the single countries, strategic industrial policy could be very effective and justified. Krugman's opposition in this case regards the difficulty, costs and risks involved in attributing a public administration the choice about sectors and products that will prove successful in the future. I think though that some risks are worth taking up, especially if the target is not a product but a technological *filière*, and if the strategic approach means taking into account the potential effects of general political decisions, not directly concerned with tariffs or export support.

In the late 1950's and early 1960's, the explicit political decision by the Italian government to postpone the introduction of color-TV broadcasting meant imposing a competitive disadvantage to domestic electronic industry that was never caught up later, with wide negative external effects on the entire technological trajectory. Conversely, in many countries the early introduction of environmental regulations on emissions meant the early development of an environmental technology industry, taking advantage of all kinds of positive feed back effects. For sure, a careful assessment of alternative strategies should be made (e.g.: military expenditure vs. medical care and research), but it is the kind of evaluations that public administrations should normally make, in all intervention fields (like infrastructure provision, etc.). Moreover, intervention policies may well be horizontal, non-sectoral policies, as those addressed to the improvement of the quality of production factors: human capital, social overhead capital, regional accessibility, information and communication networks, to which we can add institutional interventions on rules and regulations. These are not policies targeted (selectively and "strategically") to specific sectors, but may be crucial for many important ones.[7]

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[7]It is common wisdom in Italy that in the early 1980's the development of the Milan stock exchange and related financial sectors were widely hampered by both the existence of limitations on international capital movements and by the low efficiency of communication networks.

Is this neo-mercantilism? Once again, yes, in the progressive sense of the historical mercantilist thought and practice. We owe to the mercantilist view the abatement of feudal restrictions to goods mobility inside each country, the improvement of internal infrastructure in order to enhance accessibility to (national and international) markets, the utilization of the trade surplus in order to widen money supply, reduce interest rates, speed up investments, encourage entrepreneurship (Tiberi 1999).

d. Considering not just international trade patterns (as in international trade theory) but also factors movements, and international capital flows in particular, a competitive production system may mean not just a good export performance but more interestingly an international attractiveness with respect to both "real" and "financial" capital. This last fact may easily turn a potential export surplus into a trade balance deficit, allowing the country to pay for its (cheap) imports and for a rising standard of living through the international trust of the capital markets (present U.S. condition of external accounts comes close to this last picture).

This is why competitiveness and technical change should never be hampered in an open country, through any sort of social resistance to change. David Ricardo, the father with Robert Torrens of the comparative advantage principle, even if convinced of the job-killing nature of technology, in his famous chapter "On machinery" affirmed: "The employment of machinery could never be safely discouraged in a State, for if a capital is not allowed to get the greatest net revenue that the use of machinery will afford here, it will be carried abroad, and this must be a much more serious discouragement to the demand for labour, than the most extensive employment of machinery" (Ricardo 1817, p. 388 of the 1971 edition).[8] Leaving the assumption of factor immobility of the abstract model of international trade and assuming a dynamic perspective, the relevance of concerns about the efficiency of the local production sectors *vis-à-vis* the other countries appears very clearly: not only a reduced efficiency will hamper external demand but will force both capital and labour to migrate, as it will be shown later on.

5.4   Absolute Advantage and Comparative Advantage

Finally and most importantly from a theoretical point of view, there exists a relevant case where a position *à la* Krugman cannot be maintained: the case of interregional confrontation and competition among local territories. From the beginning, I want to underline that Krugman, in his contributions quoted here,

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[8]On this point too Krugman would probably agree. He writes: "Maintaining productivity growth and technological progress is extremely important; but it is important for its own sake, not because it is necessary to keep up with international competition" (Ibid., p. 101). We add that it is also important for the competitiveness of exports and for the attraction of foreign investments.

referred explicitly to the case of nations and not of regions; therefore my remarks refer mainly to the subsequent debate among regional scientists, where the two levels, the national and the regional or local one, were mixed up and their profound difference as far as our issue is concerned never really underlined.[9]

In my opinion, the law of comparative advantage does not hold in case of confrontation among local economies (inter-regional trade), and consequently the conclusion that each region will always be granted some specialisation and role in the interregional division of labour is not valid. A region can well be pushed "out of business" if the efficiency and competitiveness of all its sectors is lower than that of other regions, for the following reason: at the inter-regional level the two adjustment mechanisms that in a theoretical setting allow to pass from an 'absolute advantage regime' to a 'comparative advantage' one, namely price-wage flexibility and exchange rate movements, either do not work properly or do not even exist. On the contrary, a different, much more effective and punishing mechanism works, namely inter-regional migration of mobile factors, capital and labour.

The reasoning is as follows. Ricardo's model is a model of barter, which operates in terms of *relative* costs/prices of two goods in two countries; in this context the normative aspect of the principle (or paradox) of Ricardo is easy to demonstrate, and states that both countries have an advantage from specialisation and trade.[10]

But, passing from the normative to the positive side, can we be sure that the exchange will really occur? In normal practice the exchange occurs as a result of international operators who carry out comparisons between *absolute* prices and not between relative prices of two goods as in a barter (they compare the price of the same good in the two countries in a common currency),[11] and therefore between values in which the cost of production (in labour days) is multiplied by a monetary

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[9]A paper in which Krugman assumes a "regional" perspective will be considered at the end of this paragraph.

[10]Even if a country (let it be S) has higher costs in the production of both goods A and B because it is more inefficient (requires, for example, 2 labour days for A and 4 for B compared to N which requires one day for both goods), in relative terms it will always have a comparative advantage in one of the goods (in this case in A) in which it is relatively less inefficient. Under these conditions, where the good B is traded for A at a ratio of 1:1 in N and 4:2 = 2 in S, if the relative price of B at the international level is fixed at an intermediate level, let us say 1.5, it is shown that it is an advantage for both countries to specialise (S in A and N in B) and to perform international trade. In N in fact, the more efficient country in all production, the opportunity cost of moving a unit of labour from producing A to producing B is 1 (one unit of A is lost), while trading the additional unit of product B on the international market results in 1.5 units of A; the *gain from trade* is measured by a saving of one half labour day. The same reasoning applies for the country S: the opportunity cost of moving a unit of labour from B to A is ¼ B, while by trading on the international market the increased production of A thereby obtained, equal to ½ A, is possible to obtain 1/3 B (>¼ B). In this case, the *gain from trade* for country S is equal to 1/3 labour day.

[11]Ricardo himself reminds us that "every transaction in commerce is an independent transaction" (Ricardo 1971, p. 157); "monetary precondition for an exchange is a difference in absolute costs" (Onida 1984, p. 81; our translation).

wage and by an exchange rate. If the more efficient country presents lower prices in all goods, how could the exchange take place?

In two separate countries, between which mobility of factors is not possible and which are moving, in a logical sense, from a condition of autarchy to one of international trade, it is conceivable that, beyond a comparative advantage, there could also be an absolute advantage for each country in one of the two goods (and that therefore the absolute price, in addition to the relative price, of that good is lower than that in the other country). In fact, real wages before trade will necessarily be commensurate with the average productivity of each country and therefore the more inefficient country will have lower wages[12]; but if the lower productivity is balanced, on the average, by lower wages, the country will show an absolute advantage in the good in which productivity is above average, i.e. the good in which a comparative advantage exists. After trade, the rate of exchange will be such as to assure equilibrium in the trade balance.

So, in the case of countries, trade would occur; but what would happen if a disturbance caused wages to increase or the exchange rate of a country to appreciate? In the short term, the absolute advantage could disappear,[13] and the country would therefore not export any goods, while it would import them all, generating mass unemployment. In the long term however, equilibrium would be re-established, thanks to two alternative equilibrating movements:

i. a "classical" mechanism of downward pressure on real wages and prices, triggered by the imbalance in the labour market and by the reduction of the money supply determined by the outflow of gold (to pay for the imports) (Ricardo 1971, p. 158); and/or
ii. a "modern" mechanism of devaluation of the exchange rate, triggered by the deficit in the trade balance.

But what happens in an intra-national, territorial context? This context is by definition characterised by three elements which distinguish it from the assumptions of the international trade model:

a. it is not possible to assume an initial condition of autarchy as logical starting point, since trade between territories is the rule—between regions, between cities, between city and countryside;

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[12]This is for the simple fact that, in terms of remuneration of factors, it is not possible to distribute more than is produced in real terms.

[13]Södersten (1970), illustrating the Ricardian model in the case of many sectors, states that "the number of goods a country will export is determined by the wage rate and by the exchange rate"; if they rise, the country will lose its advantage for some goods (p. 21). He defines this last advantage as a "comparative" advantage (which, however, remains unaffected by an increase in wages or exchange rate, which act proportionately on all goods), while to all effects it is an "absolute" advantage.

b. there are movements of production factors between territories (commuting workers, labour and capital movements, purchases of estate and property assets from outside); and

c. a specific regional currency and exchange rate for each individual territory do not exist.

The theoretical effects of these three conditions are important (when giving examples, reference is made to the case of weak regions):

a′. firstly, in a macroeconomic sense, the close linkage between real wages and average productivity recorded in an isolated country in conditions of autarchy is lost. Whatever the level of monetary wages, there is no longer an internal scarcity mechanism in the market for goods which, through movements in the general level of prices, brings real wages and purchasing power to the level compatible with overall productivity: any excess demand is addressed to the purchase of external goods;

a″. in a microeconomic sense, the level of monetary wages contractually defined by companies could not be without reference to local productivity; but this reference is not as close as that required by the model, since: (i) monetary wages are largely defined through collective *national* contracts, and relate to a level (and a growth) of *average* national productivity (if not those of the most advanced regions) and not those of weak regions; (ii) when the lower average productivity of a region is due to factors external to companies (poor accessibility, low quality of public services), in order to keep local products competitive workers should accept monetary wages lower than their "factory" productivity, and this is unrealistic in a context where migration is logically and practically permitted, and where the level of prices of most goods consumed locally is at the "international" or "inter-regional" level (monetary wages lower than the national average would therefore also result in lower real wages). Wages in weak regions would therefore not fall to the levels required to assure external competitiveness in at least some products;

b′. if, due to the two preceding points, a region possesses an absolute disadvantage in all goods, and therefore suffers from rising unemployment and deficit in its trade balance, it could see this condition stabilised in time and not re-equilibrated by automatic mechanisms. Taking it to an extreme conclusion, it is in fact possible to conceive of a territory that does not produce or export anything and lives on imports, where income and internal purchasing power are assured by various alternative possibilities: by the income of commuting workers, by the sale of wealth or capital assets to foreign residents (houses, land, properties), by public transfers (pensions, unemployment benefits) or private transfers (remittances from emigrants). In this territorial context therefore, the imbalance in the trade balance does not represent a macroeconomic constraint;

b″. a situation such as that outlined above is clearly not sustainable in the long term, but in a context of factor mobility, adjustment would occur more rapidly and

more likely through emigration and depopulation rather than through a fall in real wages[14]. Both capital and labour, receiving lower than average remunerations in a region as a consequence of inefficient production conditions, whenever they will cease to be supported by external territories or by the national government through loans, income transfers or subsidies, they would promptly emigrate in search for better employment conditions.[15] Factor immobility is therefore crucial for the validity of the comparative advantage principle[16];

c′. the national exchange rate—assuming that it is linked only to trade movements and that the balance of capital movements is therefore in equilibrium at a national level—is defined by a weighted average of the regional trade balances, in general comprising "strong" regions, tending to be net exporters, and "weak" regions, tending to be net importers[17]: the former are thus in a situation of a relatively undervalued exchange rate, and the latter in a situation of a relatively overvalued exchange rate, which does not favour their exports;

c″. in a dynamic context, assuming an initial situation of inter-regional equilibrium (with each region specialising in some good), if one region sees its productivity (and competitiveness of export sectors) increase at a lower rate than that of other regions, given similar wage dynamics (defined at national level), it would see its competitive advantage decline and disappear and it would not be able to use the obvious instrument available to countries, devaluing the exchange rate. For the reasons already outlined, real wages would also not be flexible enough, and the region could therefore find itself without any specialisation or export sectors.

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[14]It is not intended to suggest here that a "real wages" effect is not set in motion; but that, given the conditions of openness to foreign trade ("international" prices of imported goods) and to factor mobility, this effect would not be sufficient or predominant.

[15]Going back to the example in foot-note 11, if a unit of good B is internationally traded for 1.5 units of A, country N, specialised in B, exchanges one internal labour day with 3 labour days of S, thanks to the difference in productivity levels. But, as stated by Ricardo, a similar situation cannot exist in the case of two regions of the same country: "The labour of 100 Englishmen cannot be given for that of 80 Englishmen (. . .). The difference in this respect, between a single country and many, is easily accounted for, by considering the difficulty with which capital moves from one country to another, to seek a more profitable employment, and the activity with which it invariably passes from one province to another in the same country" (Ricardo 1971, p. 154).

[16]Mark Blaug, presenting Ricardo's principle, explicitly argues: "The point of Ricardo's analysis is to show that the conditions that make international trade possible are quite different from the conditions under which domestic trade would arise. If England and Portugal were two regions in the same country [and the former were less efficient in all productions], all capital and labour would migrate to Portugal and both goods would be produced there. Within a nation, trade between two places requires an *absolute difference* in costs but a comparative difference is a sufficient condition for the existence of international trade" [our italics] (Blaug 1997, p. 120).

[17]In terms of macroeconomic accounts, strong regions generally show a trade surplus, balanced by higher taxes, fewer public transfers, a higher savings rate and a deficit in the balance of capital movements (what Kindleberger has called "mature creditors"); weak regions generally show opposite behaviour.

In conclusion: due to their intrinsic openness both to the movement of goods and movement of factors, regions and local territories operate in a context of inter-regional trade within a regime of "absolute advantage" and not within a regime of "comparative advantage".[18] If their absolute competitiveness is inadequate or declining with respect to the other regions, the spontaneous adjustment mechanisms which in the latter regime always assure a role in the international division of labour—even to countries structurally inefficient in all production sectors—either do not exist or are inadequate to re-establish equilibrium. Weakness conditions, due to inadequacies in production factors, adverse geographic circumstances or poor accessibility, may well result in mass unemployment and, if public transfers of income are not sufficient, emigration and possible abandonment.

The real world is full of cases where rich exporting regions coexist with poor regions (having a trade deficit), with strong long-term divergence in the levels of unemployment, since equilibrium in macroeconomic accounts is reached through the equalising role of national fiscal policies or interregional movements of capital.

There are three possible strategies of development or survival for underdevel-oped territories: carry out political lobbying aiming to secure public transfers (a strategy that is merely defensive, costly and to be rejected); improve the competitiveness of the local system, or attract investment from other regions and abroad. So, it is right and quite justifiable in a theoretical sense to be concerned with competitiveness and attractiveness, two goals that are becoming ever more relevant in the context of the European Monetary Union, where different countries find themselves in a situation like regions of a single country.

In a paper about "regional" development experience in the U.S. and the effects of adverse shocks on the specialisation sectors of the single States, Krugman looks to reflect along similar lines. In case of factors immobility, usually assumed in international trade theory, long term growth of a region hit by an adverse shock could benefit from wage and factor cost decreases, attracting new activities from outside. But, he argues, in case of factor mobility, the usual situation in an interre-gional context, "an unfortunate region will not have lower factor prices for very long: capital and labour will move to other regions until factor payments are equalized. This means however that there is no particular reason to expect a region whose traditional industries are faring badly to attract new industries. It can simply shed people instead (. . .) The story is one in which the point is not the existence of a strong force for divergence, but the absence of a force for convergence of output and employment (factor prices and per capita income do converge)" (Krugman 1993, p. 248). "If New England had been a sovereign country, it might have devalued its currency and/or pursued an expansionary monetary policy. In fact,

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[18]Presenting the theory of interregional trade and specialisation, Armstrong and Taylor affirm: "That trade is based on comparative advantage and not absolute advantage is universally accepted and rarely tested" (Armstrong and Taylor 2000, p. 123). In my opinion, this statement, when referred to regions, should not be accepted at all.

not only were these options not available, but a budget crisis forced fiscal policy to move in a pro-cyclical direction, exacerbating the slump" (ibid., p. 242).

5.5   The Sources of Territorial Competitiveness

Let us consider now in more depth the logic underlying the role of exports and foreign investments in regional contexts, and the elements that can enhance competitiveness and attractiveness of territories. I can see here five main points:

– exports are seen in all regional economics textbooks as the triggers of multiplier effects and drivers of local development. In a short-term view we can stay with this position, which sees demand as the driving force of the economy; but over the long-term, and if we wish to explain territorial development, the short-term view is no longer adequate and we have to identify the reasons for a prolonged growth of exports: we have to look at the sources of competitiveness, that is supply side factors.[19]

  In order to export, local firms have to show a higher competitiveness with respect to external firms, and territories some form of "absolute" or competitive advantage.[20] Better: this competitiveness should reside on dynamic elements, allowing the continuous recreation of the local advantage, through a flow of radical and incremental innovation (Camagni 1996, ch. 5). On which elements does this capability fund itself? Increasingly, at least in the case of advanced countries, endowment of natural resources and relative availability of traditional factors like labour and capital play a minor role.[21] What really count nowadays are two orders of factors and processes: in an aggregate, macroeconomic approach, increasing returns linked to cumulative development processes and

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[19]Using demand models such as that of Thirlwall (1980) to explain development—admittedly an elegant model, of relevance in a short-term approach—does not appear to be acceptable. The conclusion of the model that the development of a (small) region depends on the rate of growth of the world economy and the income elasticity of external demand for its exports (in addition to, inversely, the income elasticity of internal demand for imports) is in fact a true but banal statement, which only considers the deterministic and less interesting side of territorial development. It completely ignores the primary factor of productivity/competitiveness (which in these models only serves to mechanistically define the growth rate of employment once GDP growth is defined); however, this factor can readily generate local development even in a context of static global demand.

[20]Porter's concept of 'competitive advantage', developed outside the context of international trade theory, is close to the concept of absolute advantage. It can be usefully adopted, as its author does (Porter 1990, 2001), to reflect about territorial competitiveness.

[21]As factor endowment tends to become more homogeneous among (advanced) countries, international trade itself increasingly concerns similar products exchanged in the two directions, diversified by thin, qualitative elements (intra-industry or "two-way" trade).

the agglomeration of activities[22]; in a microeconomic and microterritorial approach, the specific advantages strategically *created* by the single firms, territorial synergies and co-operation capability *enhanced* by an imaginative and pro-active public administration, externalities *provided* by local and national governments, the specificities historically *built* by a territorial culture.[23] As it is clear, in the latter case—which is more interesting for us—they are all artificial or created advantages, open to the pro-active, voluntary action of local communities and their governments;

– local firms rely not only on public goods, human capital and social overhead capital, but increasingly on selected external assets and "specific resources" that cannot be easily obtained via spontaneous market developments. Therefore firms are increasingly engaged in a co-operative process with other local firms, (collective) actors and the public administration for the conception and provision of these resources (Colletis and Pecqueur 1995; Cooke and Morgan 1998);

– particular territorial conditions, determined by a particular richness of inter-firm interactions or "untraded interdependencies" (using Michael Storper's expression) (Storper 1995), may facilitate cooperation among firms and social actors and generate cumulative learning processes enhancing the innovativeness and the competitiveness of the local territorial system. A good way of depicting this process is through the concept of innovative *milieu*, developed by GREMI[24] (Aydalot 1986; Camagni 1991b; Ratti et al. 1997). In a turbulent environment characterized by difficulty in information collection, processing and assessment, strong interdependence between the decisions of different actors and great complexity in the external environment, economic actors find in the local *milieu* the necessary support for coping with uncertainty. In fact the *milieu*—consisting of shared values, common representations and codes, a strong sense of belonging, trust, common professional background and economic specialization—

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[22]We can distinguish at least three families of models interpreting these processes: cumulative models of regional development based on productivity growth and increasing returns, from historic ones (Kaldor 1970; Dixon and Thirlwall 1975) to more recent ones (Krugman 1991); cumulative models based on factor migration and the creation of a growing local market, from Myrdal (1957) to Krugman (1991); and models based on the creation of vertically integrated industrial complexes, from Perroux (1955) and Isard (1960) to Krugman and Venables (1996).

[23]As Porter puts it: "Increasingly, the drivers of prosperity and economic policy are moving to the microeconomic level—to the capabilities and behavior of units below the whole economy such as individuals, firms, industries and clusters. (...) There is growing recognition that company success also has much to do with things that are outside the company", such as "supplier relationships and the benefits of partnering" (Porter 2001, p. 140).

[24]The GREMI—*Groupe de Recherche Européen sur les Milieux Innovateurs*—chaired by the present author, is an international group of scholars located in Sorbonne University, Paris, for the purpose of studying innovative environments. The 'innovative milieu' is defined as the set of relations uniting a local production system, a set of actors and their representations, and an industrial culture, which together generate a localized dynamic process of collective learning. Some of the basic constituent elements of the local *milieu* are: mobility of specialised labour within the local labour market, innovation imitation, interfirm co-operation and linkages, common codes and conventions, and a common sense of belonging.

helps by facilitating three crucial tasks of a cognitive nature (Camagni 1991a, 1999):

- the *transcoding* of external information, its selection and evaluation a crucial task in innovative processes—allowing more accurate interpretation and a faster utilization in decision-making and in developing new business ideas. This occurs in many ways, including informal contacts, imitation, mutual assessment of "rumors" and so on; in a word, it occurs through a "socialized" or "collective" process;
- the *ex-ante coordination* of private decisions in order to permit 'collective action', both in business behavior and in the provision of public or collective goods[25];
- *the supply of the permanent substratum for collective learning processes.* Learning processes require a host of tacit, immaterial, and informal exchanges, which happen mainly *inside* large firms. But an interesting parallel to this process exists, in the case of the local *milieu*: in this case the learning processes develop mainly *outside* the individual firm (which is small and generally short-lived), but *inside* the local labour market, through the chains of professional upgrading, the mobility of skilled labor inside the area and the density of customer-supplier co-operation relations. The local *milieu*—which can be either an industrial district or a city—becomes the substratum in which long term "collective" learning processes are embedded to the advantage of the local economy (Capello 1999; Camagni and Capello 2002).

These effects are in part spontaneously generated, representing an important basis for the local increasing returns, and in part dependent upon specific and explicit cooperation among local actors, requiring some form of local governance. In both cases, the competitive weapons reside more outside the single firms than inside them, i.e. more in the local *milieu* than in a specific firm located in its geographical space;
- local territories and *milieux* compete and co-operate with each other, building their own comparative or competitive advantages. This is good for the entire economy if we hold the view of a "generative" development process taking place from below, rather than a process quantitatively defined at the macroeconomic level and then attributed in a "competitive" way to each territory (only in this last case would the efforts developed by the single territories result in a zero-sum game in relation to the competitive distribution of a predefined pay-off).

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[25]Some of the main obstacles to collective action are considered, by economic theory, to be the cost of information collection and the risk of opportunistic and free-riding behavior. In both cases, the existence of a local *milieu* limits these costs, thanks to geographical and organizational proximity, trust and the establishment of common codes for co-operation and for the punishment of improper behavior (Rallet and Torre 1995). When these costs reveal themselves to be excessive, the public sector may be called on to enforce some of the rules or contribute directly to the development and implementation of local schemes; its visibility, accessibility and accountability with respect to the local community reinforces the synergetic effect.

Cities in particular, given their nature of clusters of public goods and externalities, enhancers of interaction and local synergy, and given also the political accountability of their elected administration, may be considered competing actors on the global scene;

– firms use locations as competitive tools, and increasingly use global mobility to optimize production and distribution costs. Location territories, on the other hand, are not just the passive objects of location decisions by firms, but communities made up of economic subjects which act in their own interest by trying to keep or attract firms. Workers, subcontracting firms, suppliers of intermediate inputs, services and factors, are all agents which can achieve their goal not just by competing on prices and wages with other communities (sites), but also by upgrading the quality of their service through direct or indirect tools which involve the community and the local public administration. Locations are in a sense bought and sold on a global market, where demand and supply confront each other.

In synthesis, for sure, globalisation enhances the competitive climate in which firms operate. In order to cope with this condition, and with the consequent increasing level of dynamic uncertainty (about markets, technologies, successful organisational models), firms more and more rely on high-quality human capital, on devices or "operators" allowing fast information assessment and transcoding, and on forms of co-ordination and co-operation. As a consequence, directly or indirectly, through explicit locational decisions or through the selective effects of competition, they favour and support those territories that supply these new "relational" factors.

But if individual firms and individual people undertake collective activities, facilitated by (and creators of) trust and local social capital; and if significant cognitive synergies, readily apparent in the local *milieu,* result from their various interactions; and finally if these actions and these processes draw additional vitality from cooperation with local public administrations; then it appears justifiable to go beyond methodological individualism—which regards only single firms as operating and competing—arguing the logical validity of a 'collective' concept such as that of *territory*, and to affirm that territories compete among themselves, using the creation of collective strategies as their instrument.

5.6   Conclusions

In a globalising economy, territories and not just firms increasingly find themselves in competition with each other. In fact, differently from the case of countries, cities and regions compete, on the international market for goods and production factors, on the basis of an *absolute* advantage principle, and not of a *comparative* advantage principle; this means that no efficient, automatic mechanism may grant each territory some role in the inter-national division of labour, whatever its relative performance.

Therefore, weak and lagging territories—in terms of competitiveness of the economic fabric, internal/external accessibility, quality of the human and environmental factors, internal synergy and learning capability—risk exclusion and decline to a larger extent than in the past. Particularly in the present techno-economic phase, witnessing the increasing importance of knowledge factors, of immaterial elements linked to culture, taste and creativity, the innovative utilisation of the existing stock of codified knowledge and technologies requires greater investments in tacit knowledge, human capital, management and organisation, co-operation and networking; in a word, it requires conditions that are rare and not at all ubiquitous.

Hopefully, the way towards territorial competitiveness, engaging public administrations and local communities in the creation of a widening spectrum of "preconditions"—from hard to soft, from competitive to co-operative ones—does not mean at all a wasteful zero-sum game, as:

– competitiveness reached through territorial quality and public service efficiency brings benefits to all local economic activities, both originating from inside or from outside;
– competitiveness reached through spatial specialisation means widening roles for complementary specialisations, developed in complementary territorial contexts;
– competitiveness reached creating local synergies among actors, or integrating and embedding external firms into the local relational web, exploits technological and organisational spillovers and generates increasing returns that are at the very base of economic development, in its "generative" sense.

In these conditions, roles and responsibilities of the local development policies and spatial planning widen, facing new political and cultural challenges. Integrating economic and spatial goals; integrating different sectoral tools; stimulating local co-operation networks and partnerships; guaranteeing a real and effective participation of people and citizens to the construction of territorial 'visions' and strategies; enhancing local competitiveness through appropriate policy tools addressed to collective learning and local relational capital; all these new tasks represent relevant challenges and ask for a rapid evolution of our models of territorial governance (Camagni 2001b; Guigou and Parthenay 2001).

Coming back to the central theoretical issue of the present reflection: external competitiveness matters in a regional and urban context. "Pop internationalism"? I would rather claim: *vox populi, vox dei* ("Pop voice, god's voice").

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Regional Competitiveness: Towards a Concept of Territorial Capital

Roberto Camagni

6.1 The Resurgence of Supply-Oriented Approaches

We may argue that, in the long term, theoretical supply-oriented approaches have outperformed strictly demand-oriented ones, of a Keynesian nature, in the interpretation of regional development processes.

In fact, on the one hand, regional internal demand is not relevant, even in the short run, to drive regional growth, given the huge interregional integration and ever-increasing international division of labour. On the other hand, national demand growth is certainly more relevant to internal regional performances, but it is so on a 'on-average' basis: single regions may outperform (or under-perform) the national average at the expense (in favour of) other regions,[1] either because of a more appropriate (poorer) sectoral mix or because of a favourable (unfavourable) competitive differential.

International demand growth, too, in particular as regards specific productions, may be highly favourable to the development of specific regions specialised in high-growth demand sectors. But this relationship may probably work well in a first approximation and in the short run; in a more precise and longer-term perspective, there is no necessary reason why different regions should benefit equally from the (aggregate or sectoral) expansion of international trade. Textiles, shipbuilding or

[1]We shall find that, on an *ex-post* base, the national aggregate growth rate and the weighted sum of regional growth rates are equal.

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car production were for long considered slow-growing industries, but this fact did not prevent the emergence of regional/national success stories such as, respectively, Tuscany, Korea or Japan, areas that proved able to acquire rapidly-increasing shares of an even stagnant international market.

From an *ex-ante* and logical point of view, it is exactly this regional differential growth capability that must be interpreted, and possibly forecasted, on the basis of supply-side elements.

Integrated demand-supply approaches based on complex feed-back effects between demand-driven shoves and increasing returns effects have for long shown good explanatory capacity, especially when strong cumulative effects, either virtuous or vicious, have been widely apparent and pervasively affecting broad typologies of winner and loser regions.

Today, a more selective pattern of regional growth is emerging. It differentiates among the development paths of single regions and produces a varied mosaic of development stories. This phenomenon calls for more stringent and selective interpretations of the different regional development paths. Perhaps, scholars themselves are becoming more demanding in terms of the specific interpretation of region-specific growth paths, and more sensitive to the consequent need to build tailor-made growth strategies for each territory.

This awareness is today strengthened by a new crucial theoretical argument: in a context of globalisation and the creation of broad single-currency areas, regions (and also nations) must closely concern themselves with the competitiveness of their production systems because no spontaneous or automatic adjustment mechanism is still at work to counterbalance a lack (or an insufficient growth rate) of productivity. Currency devaluation is no longer viable (by definition in the case of regions), nor are international monetary agreements; and wage/price flexibility is not sufficient or rapid enough to restore equilibrium once it has been perturbed, mainly because wages and prices are not determined on a regional base. In terms of international/interregional trade theory, regions do not compete with each other on the basis of a Ricardian 'comparative advantage' principle—which guarantees each region a role in the international division of labour[2]—but rather on a Smithian 'absolute advantage', principle similar in nature to Porter's concept of 'competitive advantage' (Camagni 2002).

Therefore, regional and local governments must address the issue of the competitiveness and attractiveness of external firms. Definition of possible growth strategies for each region, city or territory must necessarily rely on local assets and potentials and their full—and wise—exploitation: in short, on what is increasingly called 'territorial capital'.

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[2]Every country always has a 'comparative advantage' in some production sectors, even if it may be less efficient in absolute terms in *all* productions with respect to competitor countries: its advantage resides in those productions in which it is 'comparatively' less inefficient, and it is exactly in these productions that it will specialise within the international division of labour, to the mutual benefit of all countries. The Ricardian principle of comparative advantage was judged by Paul Samuelson as the only statement of economic theory that was at the same time true and not trivial. As argued here, it refers to countries, not to regions or territories (see also Camagni 2001).

6.2 Towards a Cognitive Approach to Territorial Development: The Concept of Territorial Capital

Does the above signify that, in terms of interpretive theoretical tools, we are back with traditional, supply-side neoclassical models? In a sense 'yes', as local competitiveness cannot but be linked to local supply conditions. But these supply conditions must perforce refer to factors completely different from the traditional ones—namely capital and labour, local resources, and infrastructure endowment. The huge theoretical heritage of the endogenous development literature—industrial districts, *milieux innovateurs*, production clusters—has long directed regional scholars' attention to intangible, atmosphere-type, local synergy and governance factors: what in the last decade were re-interpreted in the form of social capital (Putnam 1993), relational capital (Camagni 1999; Camagni and Capello 2002) or, in a slightly different context, as knowledge assets (Foray 2000; Storper 2003; Camagni 2004).

The shift is not at all merely terminological: a cognitive approach is increasingly superseding the traditional functional approach to show that cause-effect, deterministic relationships should give way to other kinds of complex, inter-subjective relationships which impinge on the way economic agents perceive economic reality, are receptive to external stimuli, can react creatively, and are able to co-operate and work synergetically. Local competitiveness is interpreted as residing in local trust and a sense of belonging rather than in pure availability of capital; in creativity rather than in the pure presence of skilled labour; in connectivity and relationality more than in pure accessibility; in local identity besides local efficiency and quality of life.

The theoretical elements that support the new methodological approach may be found in the following:

- the theory of bounded rationality and decision-making under conditions of uncertainty, from the seminal contributions of Malmgren and Simon (Malmgren 1961; Simon 1972) to their application to industrial innovation (Nelson and Winter 1982; Dosi 1982);
- the institutional approach to economic theory based on a 'theory of contracts' which emphasizes the importance of rules and behavioural codes, and of institutions that "embed transactions in more protective governance structures" (Williamson 2002, p. 439), reducing conflicts and allowing mutual advantages to be gained from exchange;
- the cognitive approach to district economies and synergies, which comprises the Italian school (Becattini 1990), the French 'proximity' approach (Gilly and Torre 2000), the GREMI approach to local innovative environments (Camagni 1991; Camagni and Maillat 2006),[3] and Michael Storper's concept of 'untraded

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[3]GREMI—*Groupe de Recherce Européen sur les Milieux Innovateurs*, headquartered in Paris at Université de Paris 1—Panthéon Sorbonne and active since the mid-1980s.

interdependencies' (Storper 1995). The GREMI group conceives proximity space or the local 'milieu' as an uncertainty-reducing operator which works through the socialised transcoding of information, cooperation enhancing, and the supply of the cognitive substrate—represented mainly by the local labour market—in which processes of collective learning are embedded (Camagni 1991; Capello 2001).

All the above elements—which add to, and do not substitute for, more traditional, material and functional approaches—may be encompassed and summarized by a concept that, strangely enough, has only recently made its appearance, and has done so outside a strictly scientific context: the concept of *territorial capital*. This was first proposed in a regional policy context by the OECD in its *Territorial Outlook* (OECD 2001), and it has been recently reiterated by DG Regio of the Commission of the European Union: "Each Region has a specific 'territorial capital' that is distinct from that of other areas and generates a higher return for specific kinds of investments than for others, since these are better suited to the area and use its assets and potential more effectively. Territorial development policies (policies with a territorial approach to development) should first and foremost help areas to develop their territorial capital" (CEC 2005, p. 1).

As is widely apparent from this research work, 'territory' is a better term than (abstract) 'space' when referring to the following elements:

– a system of localised externalities, both pecuniary (where their advantages are appropriated through market transactions) and technological (when advantages are exploited by simple proximity to the source);
– a system of localised production activities, traditions, skills and know-hows;
– a system of localised proximity relationships which constitute a 'capital'—of a social psychological and political nature—in that they enhance the static and dynamic productivity of local factors,
– a system of cultural elements and values which attribute sense and meaning to local practices and structures and define local identities; they acquire an economic value whenever they can be transformed into marketable products—goods, services and assets—or they boost the internal capacity to exploit local potentials;
– a system of rules and practices defining a local governance model.

Accordingly, the OECD has rightly drawn up a long, sometimes plethoric but well-structured, list of factors acting as the determinants of territorial capital, and which range from traditional material assets to more recent immaterial ones. "These factors may include the area's geographical location, size, factor of production endowment, climate, traditions, natural resources, quality of life or the agglomeration economies provided by its cities, but may also include its business incubators and industrial districts or other business networks that reduce transaction costs. Other factors may be 'untraded interdependencies' such as understandings, customs and informal rules that enable economic actors to work together under conditions of

uncertainty, or the solidarity, mutual assistance and co-opting of ideas that often develop in clusters of small and medium-sized enterprises working in the same sector (social capital). Lastly, according to Marshall, there is an intangible factor, 'something in the air', called the 'environment' and which is the outcome of a combination of institutions, rules, practices, producers, researchers and policy makers that make a certain creativity and innovation possible" (OECD 2001, p. 15).

Given these premises, the new concept of territorial capital deserves closer inspection, and mainly in regard to its components and economic meaning. On the one hand, it is clear that some items in the above list belong to the same abstract factor class and differ only in terms of the theoretical approach of their proponents, while some others are lacking. On the other hand, whether the notion of 'capital' can be applied to many of these factors is questionable, because they do not imply an investment, an asset requiring a remuneration, or a production factor expressed in quantitative terms.

The next section proposes a possible theoretical taxonomy.

6.3 Territorial Capital: A Theoretical Taxonomy

A three-by-three matrix, both theoretically sound and relatively exhaustive, can be proposed to classify all potential sources of territorial capital. It is built upon two main dimensions:

– rivalry: public goods, private goods and an intermediate class of club goods and impure public goods; and
– materiality: tangible goods, intangible goods and an intermediate class of mixed, hard-soft goods.

The four extreme classes—high and low rivalry, tangible and intangible goods— represent by and large the classes of sources of territorial capital usually cited by regional policy schemes. They can be called the 'traditional square'. On the other hand, the four intermediate classes represent more interesting and innovative elements on which new attention should be focused; they can be called the 'innovative cross' (Fig. 6.1).

These latter components comprise, on the materiality axis, mixed goods characterized by an integration of hard and soft elements, material goods and services which indicate a capacity to translate virtual and intangible elements into effective action, cooperation, public/private partnership, supply of services: a capacity, that is, to convert potential relationality into effective relationality and linkages among economic agents. On the rivalry axis there is an intermediate class of goods encompassing two different relevant cases:

– impure public goods in which, as in pure public goods, excludability is low, but rivalry is higher because, for example, of increasing congestion and scarcity. In this case, rivalry may also take the form of interest conflicts among different

Fig. 6.1 Traditional and innovative factors of territorial capital

the 'traditional square'   the 'innovative cross'
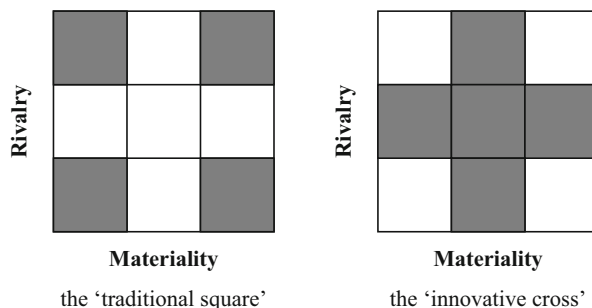
types of users or between the class of generic (and respectful) users and some specific free-riders whose action may endanger the consistency of the public territorial goods;
– club goods, where the opposite condition holds, namely high excludability (with respect to non-members) and low rivalry.

A third intermediate class, likened here to the category of private goods, can be represented by 'toll goods': a typology of public goods whose use, because it is excludable, is subject to a toll levied by the public administration or by a concessionaire. The closer the price paid is to the production and maintenance cost, the less these public goods are distinguishable from ordinary private goods.

In all these intermediate cases, a crucial control function must be performed by public authorities in order to keep the potential benefit to the local community high and pervasive. Rules, regulations and authorities must be put in place, and they must maintain a well-balanced and wise position. But also new forms of local governance based on agreements, cooperation and private/public synergy can perform well, and even better than traditional 'government' interventions.

The various categories of territorial capital are set out in Table 6.1 and then described.

6.3.1 Public Goods and Resources

Traditional public goods are social overhead capital and infrastructure, natural and cultural public-owned resources, environmental resources. They are at the basis of the general attractiveness of the local territory, and they represent externalities which enhance the profitability of local activities. Two factors limiting the full exploitation of these resources may be pointed out: unsustainable exploitations and increasing land rents which appropriate a large share of potential profits. Counterbalancing elements and policies in these cases may be: enforced regulations—on resource or land use—and 'polluter pays' taxation in the case of environmental or landscape damage; taxation with earmarking for resource maintenance and accessibility in the case of land rents.

Table 6.1 A theoretical taxonomy of the components of territorial capital

	Tangible goods (hard)	Mixed goods (hard + soft)	Intangible goods (soft)
High rivalry (private goods)	Private fixed capital stock Pecuniary externalities (hard) Toll goods (excludab.) *c*	Relational private services operating on: - external linkages for firms - transfer of R&D results University spin-offs *i*	Human capital: - entrepreneurship - creativity - private know-how Pecuniary externalities (soft) *f*
(club goods) (impure public goods)	Proprietary networks Collective goods: - landscape - cultural heritage (private "ensembles") *b*	Cooperation networks: - strategic alliances in R&D and knowledge - p/p partnerships in services and schemes Governance on land and cultural resources *h*	Relational capital: - cooperation capability - collective action capability - collective competencies *e*
(public goods) **Low rivalry**	Resources: - natural - cultural (punctual) Social overhead capital: - infrastructure *a*	Agencies for R&D transcoding Receptivity enhancing tools Connectivity Agglomeration and district economies *g*	Social capital: - institutions - behavioural models, values - trust, reputation - associationism *d*

R i v a l r y

M a t e r i a l i t y

6.3.2 Intermediate, Mixed-Rivalry Tangible Goods

Intermediate mixed-rivalry goods, namely: proprietary networks in transport, communication and energy; public goods subject to congestion effects; collective goods made up of a mix of public and private-owned goods like the urban and rural landscape, or complementary assets defining a cultural heritage system. The first category is generally subject to a control authority guaranteeing fair access, the absence of monopoly pricing, sufficient maintenance and innovation of the network/good. The last two categories deserve closer inspection: they mainly comprise public or collective goods subject to congestion or free-rider effects that require a mix of control and incentive measures in order to maintain the potential beneficial externalities that they may supply.

In these cases, careful, far-sighted and sustainable private use (or complementary use) of the resource is necessary, and game theory does not allow us to exclude short-term, opportunistic behaviour by some users (or property owners) (Greffe 2004). In the case of the strict complementarity of single private

goods (e.g., a historic city centre represented by multiple properties and a mix of private and public goods), the long-term advantage of cooperative behaviour is clear; but awareness of this fact depends on the cultural and economic homogeneity of the property owners. Here, a strong sense of belonging and territorial loyalty coupled with a far-sighted business perspective and the social stigmatisation of opportunistic behaviour—the '*milieu*' effect—may result in favourable collective action, easy p/p agreements, and fruitful local synergies (Camagni et al. 2004). In this case, the *milieu* itself may be the true territorial capital allowing long-term efficiency in the economic exploitation of local resources (see typology *e*) in the taxonomy).[4]

6.3.3 Private Fixed Capital and Toll Goods

Private fixed capital stock is, of course, a traditional component of territorial capital. In the short term it may be considered a territorial endowment which enables advantage to be taken of expansions in world trade demand; in the longer run it may be volatile and mobile, although it may be anchored to the local realm by softer but characteristically local and less mobile factors like skills, entrepreneurship and knowledge. In the same class one may also place pecuniary externalities, of a hard nature, encompassing high quality capital goods or intermediate goods produced in the local context and sold on the market.

A third category, already mentioned, comprises public but tolled goods, in particular when the tolls fully cover construction and maintenance costs.

6.3.4 Social Capital

To be found on the side of intangible goods, still of a public or collective nature, is social capital. The concept (Coleman 1990; Putnam 1993; Grootaert and van Bastelaer 2001) may be considered now sufficiently established, but its economic nature and its components still do not find sufficient consensus among scholars. Social capital can be defined as the set of norms and values which govern interactions between people, the institutions into which they are incorporated, the relational networks established among various social actors, and the overall cohesion of society. In a word, social capital is the 'glue' that holds societies together.

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[4]Does all this mean that the local *milieu* is *per se* an ethical and environment-friendly subject or intermediate institution? The answer is 'no', of course: a lobbying and short-term strategy by local, situation-rent seeking actors is not excluded, if not probable, and a mix of regulations and incentives implemented by public bodies seems necessary. In the case of external challenges and threats to local business, the presence of a *milieu* guarantees a faster and more effective reaction capability (Camagni and Villa Veronelli 2004, describing the case of an apple-producing community in the Trento Valley, Italy, challenged by the anti-pesticide health regulations imposed in their major German market).

For economists it includes the capital represented by the rules, habits and relationships which facilitate exchange and innovation, with the consequence that it affects economic development. It is in fact almost unanimously accepted that if a market is to function properly, it needs shared norms as well as institutions and modes of behaviour which reduce the cost of transactions, which ensure that contracts are observed and implemented, and which can rapidly resolve disputes.[5]

However the concept of social capital has difficulties and ambiguities of an analytical and linguistic nature which still obstruct its full acceptance. The term 'capital' denotes that it is an asset, or stock, accumulated over time which generates a flow of benefits, not just a set of values and social organizations. As a consequence, it should be possible to show that it is built up through a process involving costs or investments, at least in terms of individual and organisational time and effort.[6] On the other hand, social capital is created and accumulated through slow historical processes, and its original function is not directly linked to economic goals, namely an increase in economic efficiency. Therefore, it may be seen as "a by product of a pre-existent fabric of social relationships, oriented to other goals" (Bagnasco 2002, p. 274). Rather than being a measurable input to add to other factors of production, it can be considered a public good that produces externalities for the entire economic system, increasing the efficiency of the other factors. From this perspective it would be more appropriate to equate social capital with another well-known economic variable: the level of technological knowledge which, in a production function, moves 'total productivity' of production factors upwards (Camagni 2004).

In order to avoid an excessively broad definition of social capital, and its use as a 'catch-all' term, it seems helpful to set out a classification of the different components of social capital according to two dimensions, or relevant dichotomies: the micro-macro dichotomy, which distinguishes elements directly involving single individuals from those of the system, and the dichotomy between the formal and the informal dimension, distinguishing elements expressed through observable objects (roles, networks, norms or social structures) from more abstract elements such as values, representations, attitudes and codes of behaviour (Fig. 6.2).

The macro dimension comprises institutions and rules in the sense of Williamson and North: "the rules of the game in a society or, more formally, the humanly devised constraints that shape human interaction" (North 1990, p. 3). They may be formally expressed and objectively defined, or they may be informal, and here the reference is to conventions, codes of behaviour, values and representations. The micro dimension comprises—among the formal elements—social networks

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[5]If we add further factors—reciprocal trust, a sense of belonging to a community that shares values and behaviours, and participation in public decisions—then a climate is created which encourages responsibility, cooperation and synergy. Such a climate enhances productivity, stimulates creativity and ensures more the effective provision of public goods.

[6]This is the rationale of research programmes which attempt to measure social capital by using suitable proxies (Putnam 1993; Arrighetti et al. 2001) so as to include it in an ideal production function along with human capital and physical capital.
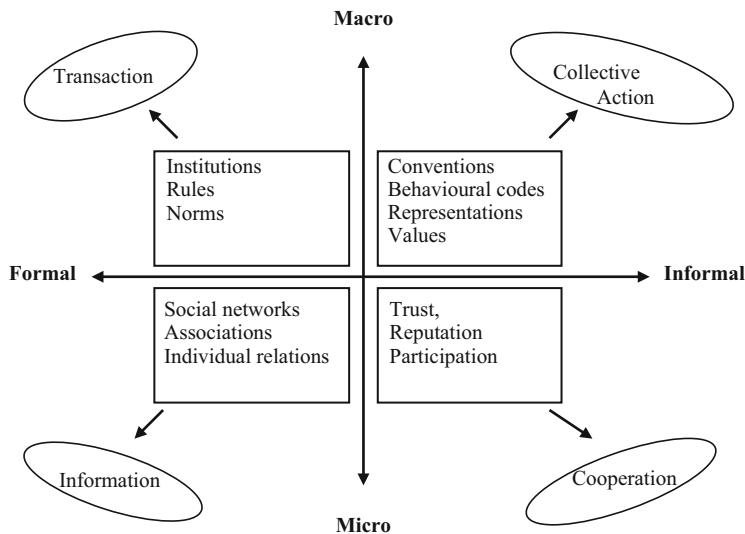
Fig. 6.2 Dimensions, forms and roles of social capital. Source: Camagni 2004

and associations, the ability to focus and organise within organised structures (even loose structures), a large range of interactions among social actors, as well as individual relationships, seen as the set of relations and contacts an individual possesses and which may be invested in economic and social activity. Among the informal elements, however, are trust and reputation and all the non-structured forms of individual participation in public or collective decisions.

There are many channels through which the different elements of social capital may affect local development. At the risk of oversimplifying the theoretical framework, we may state that each case has a more direct role in a specific direction, as indicated in the ovals of Fig. 6.2.

Institutions, rules and norms, in fact, fairly explicitly aim to reduce *transaction costs*, or the use costs of the market. They provide guarantees for contracts and obligations, efficiently manage problems of company law and governance, monitor for conflicts of interest and monopoly practice: in short, they create a favourable business climate which benefits local firms and enhances attractiveness for external firms. Social networks and associations aim to reduce the costs (and increase the availability) of *information*, particularly for current and potential commercial partners. They widen the potential market, make it easier to identify and sanction opportunistic behaviour, and accelerate the transmission of information on good practices, thereby facilitating their imitation and diffusion. Conventions and common values allow *collective action* among private parties to be undertaken more easily, i.e. the ex-ante coordination of individual decisions in order to achieve the advantages of economies of scale, purpose and complementarity. In many cases it is only if decisions are taken concurrently that costs can be reduced and complex projects made profitable and viable. Trust and reputation facilitate exchanges and

repeated contracts, *cooperation* (covenants, strategic alliances, contracts—even incomplete—between customers and suppliers) or partnerships between public and private parties.

In all cases, the importance of social capital for economic activity is entirely evident.

6.3.5 Relational Capital

Social capital may be given either a 'systemic' or a 'relational' interpretation according to the generality of the approach, the emphasis on a 'general purpose' vs. a 'selective' interpretation of its economic role, and the attention paid to economic potential vs. actual economic outcome. While it may be argued that a social capital exists wherever a society exists, 'relational' capital may be interpreted as the set of bilateral/multilateral linkages that local actors have developed, both inside and outside the local territory, facilitated in doing so by an atmosphere of easy interaction, trust, shared behavioural models and values. In this sense, relational capital is equated with the concept of local *milieu*, meaning a set of proximity relations which bring together and integrate a local production system, a system of actors and representations and an industrial culture, and which generates a localised dynamic process of collective learning (Camagni 1991). Geographic proximity is associated with *socio-cultural proximity*—the presence of shared models of behaviour, mutual trust, common language and representations, common moral and cognitive codes.

The role of the local *milieu*, and consequently of relational capital, in terms of economic theory is linked to three types of cognitive outcome which support and complete the normal mechanisms of information circulation and coordination of agents performed through the market: namely, reduction of uncertainty in decisional and innovative processes through socialised processes of information transcoding and imitation/control among potential competitors; ex-ante coordination among economic actors facilitating collective action; and collective learning, a process occurring within the local labour market and which enhances competencies, knowledge and skills.[7]

In public/private terms, relational capital and *milieu* effects belong to an intermediate class where 'collective' rather than public efforts and investments give rise to beneficial effects that can be exploited only by selectively chosen partners

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[7]Also to be mentioned here is the function of promoting informal guarantees for the honouring of incomplete contracts, which the *milieu* can perform because of its networks of interpersonal relations. Models inspired by game theory have been used to show that, when there are interpersonal networks and effective mechanisms for punishment, social exclusion and reprisal, implying a reduction in the costs of monitoring and enforcement of contracts, it is possible not only to attain stable (cooperative) Nash equilibria which are not possible when costs are high, but also to achieve overall benefits for the partners which exceed the allocative costs of local contractual policies (or 'parochialism') (Bowles and Gintis 2000).

located in particular territories with specific identities, and sharing similar interests and values. The concept of club goods seems best suited to interpreting this condition.

6.3.6 Human Capital

The presence of human capital is today constantly cited as a fundamental capital asset available to territories so that they can compete in the international arena by both strengthening local activities and attracting foreign ones. Endogenous growth theories long since developed the concept into formalised growth models (Lucas 1988; Romer 1990), thereby starting a significant and fruitful process of convergence between stylised approaches and qualitative, bottom-up development theories (Capello 2016). In parallel, the concept of territorial capital, once it has been duly developed and analytically structured, could become the attractor and the interlocking element between the two theoretical trajectories—endogenous growth and endogenous development theories.

Besides human capital, this class also comprises the pecuniary externalities supplied by the territorial context in terms of advanced private services in the fields of finance, technological and marketing consultancy, customized software packages, and so on.

6.3.7 Agglomeration Economies, Connectivity and Receptivity

Again belonging to the class of public or collective goods of a mixed—hard and soft—nature are those elements of territorial capital that concern:

– agglomeration economies or—in different territorial contexts characterised by specialisation in some sectors, technologies or *filières*—district economies. Cities and industrial districts, viewed as archetypes of the territorial organisation of production and social interaction, exhibit clear similarities in theoretical terms in spite of their geographical and economic differences (proximity and high density of activities, concentration of social overhead capital, density of interaction, high cohesion and sense of belonging) (Camagni 2004). These similarities give rise to economic advantages like the reduction in transaction costs, cross-externalities, division of labour and scale economies that constitute a large part of territorial capital;
– connectivity, by which is meant the condition in which pure physical accessibility is utilised in a targeted and purposeful way by the single actors in order to collect information, organise transactions, and exchange messages in an effective way;
– receptivity, or the ability to extract the highest benefit from access to places, services or information;

– transcoding devices operating in the field of knowledge accumulation and diffusion, mainly in the form of public agencies facilitating interaction among research facilities, universities and firms and whose mission is to create a common language and shared understanding among the above-mentioned bodies.

6.3.8 Cooperation Networks

This category of territorial capital lies at the centre of the 'innovative cross'. It integrates tangible and intangible assets and yields goods and services traditionally supplied through public/private or private/private cooperation networks. Strategic alliances for R&D and knowledge creation supported by (or partially supporting) public agencies for the dissemination and diffusion of knowledge, operating on the open market with some public support, are the key tools for a fair and fast implementation of the knowledge society.

But the advantages of a public/private partnership strategy do not reside only in management of the knowledge filière. The strategy also allows crucial potential results to be achieved by urban schemes for the development of large urban functions and services (where ex-ante coordination among partners enhances private profitability and public efficiency in the investment phase).

A third area in which this class of territorial capital is manifest consists of new forms of governance in spatial planning and land-use, a field characterised by both market failures and government failures, but also by huge risks of contradictory strategies and undesirable outcomes if individual, piecemeal, non-cooperative private decisions are not controlled (OECD 2001).

In all the cases mentioned above, the term 'capital' can be used on sound economic bases: the construction of relational networks and cooperation agreements involves real and costly investments which are usually overlooked owing to their nature as implicit or sunk costs (management time, organisational costs, risk of failure or of opportunistic behaviour by potential partners) (Camagni 1993).

6.3.9 Relational Private Services

Of course, in many cases certain crucial services of a relational nature may be supplied entirely by the market: for example, when firms search for external partners and suppliers (through financial institutions or specialised consultancy agencies), or in the cases of technological transfer, partnership and diffusion. University spin-offs also belong to the class of potential territorial assets to be supported by internal rules and public incentives—financial or 'real'.

6.4   Conclusions

It appears from the foregoing discussion that territorial capital is a new and fruitful concept which enables direct consideration to be made of a wide variety of territorial assets, both tangible and intangible, and of a private, public or mixed nature.

These assets may be physically produced (public and private goods), supplied by history or God (cultural and natural resources, both implying maintenance and control costs), intentionally produced despite their immaterial nature (coordination or governance networks) or unintentionally produced by social interaction undertaken for goals wider than direct production. In all cases, a repeated use in successive production cycles of these assets is implied, and the usual accumulation-depreciation processes take place—as in the case of physical capital assets. In most cases, the accumulation process is costly, except when socialised processes taking place within the territorial context are responsible for the cumulative creation and value of an immaterial asset.[8]

The economic role of territorial capital is to enhance the efficiency and productivity of local activities. A stylised, potential treatment of the single elements of territorial capital should address its efforts towards finding a way to measure each of them quantitatively. The impossibility of direct measurement implies equating the effects of territorial capital with 'technological progress' in a production function—but this would only be a measure of our 'ignorance'.

This chapter has proposed a preliminary taxonomy of the various components of territorial capital. Based on the two dimensions of rivalry and materiality, this taxonomy has gone beyond the traditional 'square' encompassing pure private and pure public goods, human capital and social capital. An intermediate class of club-goods or impure public goods has emerged which implies, or requires, strong relationality and seems of great relevance to the governance of local development processes. On the one hand stand proprietary networks—of a hard nature when they are physical, or a soft one when they concern cooperation agreements and the supply of common services; on the other, there are public goods subject to congestion or to opportunistic, free-rider or endangering behaviour. In both cases, new forms of governance, participatory and inclusive, should be developed in order to accomplish the maximum benefit for the members of the 'club'—the local community. The presence of social or relational capital in the form of trust and cooperative attitudes is highly beneficial in this respect.

Generally, tangible assets are subject to traditional supply processes, while intangible assets operate in the sphere of 'potentials'. The 'mixed' category, which merges the two components together, translates abstract potentials into actual assets by defining shared action strategies, complex relational services, and concrete cooperation agreements between private and public partners.

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[8]This feature is also present in the case of physical, costly capital assets, e.g. the effects of increasing agglomeration externalities on the value of real estate assets.

The 'mixed' category of hard+soft goods has the further advantage of highlighting the relevance of such complex territorial organisations as cities or 'districts'. These are sorts of collective goods built through the spontaneous, un-organised action of a multitude of local actors, private and public, and which thus generate wide externalities for the entire community. Once again, wise control policies should be implemented in order to avert the implicit risk of rent-seeking behaviour: the localised nature of these public goods automatically generates increases in land rents which, on the one hand, may be beneficial in that they trigger a continuous upward selection process in the quality of local activities and a 'filtering down' process of lower order functions along the urban hierarchy, but on the other hand subtract potential profits from productive (social classes and) uses.

All the above considerations have significant implications for new spatial development policies (OECD 2001; Camagni 2001) which introduce governance styles addressed to cooperation and relationality. A telling example of the style required is provided by the new strategies necessary to cope with the issue of the knowledge society: instead of (or besides) injecting public money directly into the system of firms, universities and research centres, which by and large are self-referential systems with their own specific goals, public policy should support 'relational' actions, such as common schemes and production projects built through cooperation among the above-mentioned actors operating on the local or regional scale; or it should support 'transcoding' services linking scientific output and business needs/ideas, such as transfer of R&D, development of a science-based entrepreneurship or university spin-offs. More generally, the approach suggests a new role for local or regional policy-makers as the 'facilitators' of linkages and cooperation among actors, both at the regional and the inter-regional/inter-national scale.

The theoretical model proposed by this volume fully acknowledges the role of territorial capital, whose components are included, as far as possible, in the formalised econometric tools.

In general, territorial capital is at the base of the regional performance part of the model focusing on the differential-shift component of regional growth. Territorial assets are, in fact, found in the spheres of economy (R&D, human capital), economic geography and urban-territorial structure (presence of large agglomerations, accessibility and peripherality). Relationality is accounted for through spatial spillover effects differentiated by typology of regions; agglomeration economies through urban structure and polycentrism; accessibility and connectivity through market potential functions; governance and institutional effects through continental political barriers and Union accession processes.

Other classes of territorial capital—namely those of a soft nature like social capital—are impossible to manage quantitatively, given the present state of regional statistics, but they warrant closer inspection in the next phases of the research programme.

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After-Crisis Scenarios for the European Regions

7

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7.1 Introduction

The main goal of this paper is to build after-the-crisis scenarios for European regions, using both qualitative reflections and a "quantitative foresight" methodology created by the authors (Capello et al. 2008), and referring in particular to globalization processes, role of emerging economies, energy trends and new roles of rural areas.[1]

The methodology applied to develop these scenarios starts from a general reflection on what the crisis has brought (and will bring) about. The simple extrapolation of past trends does not seem meaningful in a context where numerous factors of strategic significance are changing (globalization, energy paradigm, climate change, social orientation, recent economic crisis, etc.) and are likely to give rise to a clean break with respect to the past. Huge contradictions emerged in the recent past, which were highly responsible for the present crisis: the debt-driven aggregate demand in advanced countries; the financialization of western economies, and the bizarre evidence of new emerging countries like China and BRICs, relatively

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poor countries, supporting western real incomes through a wide supply of low-price goods, but also western (and particularly the U.S.) balance of payments. All these elements in fact are due to change in the long but also in the short run.

These qualitative reflections are used as the basis for what we call quantitative foresights, in that they are neither pure forecasts, aiming to obtain precise values of specific economic variables in the future, on the basis of extrapolations from a system of past socio-economic relations, nor foresights, mostly qualitative in nature, with the aim to provide an image of the future based on radical breaks. Our quantitative foresights require first of all a scenario building exercise whereby an image of the future is constructed on the assumption that a discontinuity will emerge in the main elements or driving forces that influence and regulate the system. The changes in the driving forces are translated into quantitative assumptions for a macro econometric regional growth model created by the authors, called MASST (an acronym recalling its structural feature, namely a macroeconomic, social, sectoral, territorial model: Capello 2007; Capello et al. 2008, 2011),[2] a methodology as neutral as possible, leaving to the model the task of producing the trends and behavioural paths of European regions up to 2025.

7.2   Qualitative Scenarios: Some Methodological Aspects

The need for anticipatory and far-looking economic visions has always induced economists to seek reliable methodologies with which to produce insights into what the future will look like. Among existing alternative methodological exercises, the distinction between forecasts and foresights is useful, and helps specify the approach used in this work. In general, a forecast aims to obtain precise values of specific economic variables in the future, on the basis of extrapolations from a system of past socio-economic relations. Exactly because they extrapolate from past tendencies, forecasts yield the best results in a short-term perspective. The aim of a forecasting exercise is, in general, to achieve a quantitative value in a certain year, paying little attention to the intermediate path, or to the feedback and adjustment processes by which the end value is determined.[3]

Foresight is a radically different exercise. It is mostly qualitative in nature, and its aim is to provide an image of the future based on radical breaks, on structural effects which destroy past tendencies. A new technological paradigm, new socio-cultural models, new political regimes are all examples of structural breaks in the elements regulating an economic system which give rise to completely new and radically different paths to the future. A foresight is a possible, probable and sometimes desirable image of the future under the assumption that these events, or perhaps only one of them, will occur. Contrary to forecasts, foresights do not

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[2]For the technical features of the MASST model, see Appendix 1 and ESPON Project 3.2 (2005).

[3]On forecasting methodologies see, among others, (Armstrong 1985; Hawkins 2001; Hendry and Clements 2001; Loomis and Cox 2000).

address the dynamic processes that will produce the final outcome; rather, they explore the general consistency of the final image by analysing all the adjustment processes that are likely to happen. In general, a foresight is built on an image of what the future will look like (explorative projections), but also of what the future should look like (desirable projections). Foresight provides insights into the future based on a structural and radical break with the past, and assuming in general a long-term perspective (usually decades).[4]

The logic of our methodology is not new. It was applied already in other scenario exercises, the most recent of them aiming at capturing the different effects of a long term vs. a short-term, fast recovery of countries from the economic crisis (Capello et al. 2011). The peculiarity of this methodology is to be neither that of a pure forecast nor that of a pure foresight. Our approach can be defined as a *quantitative foresight*, in that it involves scenario building whereby an image of the future is constructed on the assumption that a discontinuity will emerge, and this discontinuity is inserted in the form of new values of the levers of our forecasting econometric model.

In this particular scenario, the discontinuity lies in the structural breaks provoked by the crisis, and in particular on the perception that economic agents and governments will have of these breaks. What is called a "*reference scenario*" is built, under the assumption that there will be a perception that structural changes will happen, but policies will not act in an effective way. This scenario will be compared to a second one, called the *pro-active scenario*, in which changes will be perceived and even anticipated; the capacity to pro-act by macroeconomic, industrial and legislative policies will be large. The third scenario, the *re-active or defensive* one, will be based on the assumptions that changes are not fully perceived by economic actors. The general attitude will be a defensive one, protecting existing structures, sectors and firms; development assets will be more similar to the past, and risks of low development rates higher.

The construction of these three "integrated" scenarios builds upon a previous reflection on single "thematic" scenarios on the likely trend of some general driving forces: globalization, technology, demography, settlement structure, energy and oil prices. The difficulty lies in assuring an internal consistency among the hypotheses concerning these single trends, combining them in a coherent way inside three differentiated scenarios, with labels that suggest the main character of the single scenarios. These scenarios do not differentiate with each other in terms of economic performance, which is only the final outcome, but in terms of internal interrelated trends of the main driving forces and social attitudes. The subsequent translation of the hypothesized and likely exogenous trends into quantitative levers of the model allows achieving a crucial goal: modeling and calculating the many feed-back effects that will take place among the different dimensions of the forecasting mechanism and among the different European territories: technological and

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[4]On foresight methodologies see, among others (CEC 2004; Miles and Keenan 2000; UNIDO 2004).

productivity trends, GDP and income growth, employment growth, migrations, spatial spillover effects, etc.

7.3 The Three After-Crisis Scenarios

7.3.1 The Reference Scenario

The reference scenario is not to be considered as a trend scenario in the conventional sense, because the simple extrapolation of past trends does not seem meaningful in a context where numerous factors of strategic significance are changing (globalization, energy paradigm, climate change, social orientation, recent economic crisis, etc.) and are likely to give rise to a clean break with respect to the past. Huge contradictions emerged in the recent past, which were highly responsible for the present crisis: the debt-driven aggregate demand in advanced countries, highly sensitive to the conditions of the financial markets and widely responsible for the emergence and sudden explosion of the real estate bubble; the financialization of western economies, leading to an overlooking of the problems of the "real" economy; the bizarre evidence of new emerging countries like China and BRICs, relatively poor countries, not only supporting western consumption (and real incomes) with a wide supply of low-price goods, but also supporting western (and particularly the U.S.) balance of payments with huge acquisitions of Treasury bonds and financial assets. All these elements in fact are due to change in the long but also in the short run.

The balance of the geo-political game will be different with respect to the past. Winning assets will be different. The dollar will not be any longer the only reference currency for international exchanges. A "regionalized" globalization will probably take place, with the large "triad" areas (Europe, America, East and South Asia) becoming more independent and more internally integrated. BRICs will enter progressively in the medium and high technology game and will become sources of international demand, given the increase of internal per-capita incomes. On the other hand, the purchasing power in western countries, particularly of some groups (retirees, civil servants, low income groups), will be particularly affected.

Hopefully, a lower real wage increase in western countries and the already mentioned "regionalized" globalization will enable some recovery of manufacturing activities in Europe, especially if a number of new technologies will develop: nanotech, biotech, transport technologies, new materials, green economy.

While European demography stagnates and the ageing process intensifies, a number of changes are likely to crystallize in the macroeconomic context. The regionalization of the globalization process reduces the amount of external FDIs into Europe, with the exception of those (sovereign funds, etc.) aiming at taking over European businesses of strategic character (technology, brands, etc.). European investments are less substantial but more concentrated on Europe and on its external periphery and neighborhoods (including Ukraine, Moldova, Turkey,

Egypt, North Africa). The integration of currencies takes place at the scale of large world regions (North America, Europe, Asia, Gulf States), but these fluctuate more between themselves at that scale. The US dollar loses its importance as reserve currency. The deflationist effect of Asia (mainly of China) on the world economy is strongly attenuated and progressively disappears. Inflation increases as well as real interest rates. The growth of real income in Europe is more modest than before. The purchase power of specific groups (retirees, civil servants, low income groups) is particularly affected. The new generations maintain their standards of living in selling their heritage and properties. The regionalization of globalization enables the recovery of manufacturing activities in Europe. Disparities in the productivity of the main economic sectors increase, especially between advanced economic functions (financed by capital) and basic services (paid by incomes, including social transfers).

Growing oil and gas prices will favor investments in oil and gas exploration and discovery, and the Arctic region will become a strongly targeted region in this respect; regional tensions and possible conflicts are not excluded. The expansion of nuclear energy will be constrained by the progressive depletion of uranium resources.

The most important effect of all these changes and contradictions, and the element on which new hopes for re-launching growth in advanced countries will be the emergence of a new paradigm: the *"green economy paradigm"*. Its importance resides in its pervasiveness (hence the term "paradigm"): it will enter almost all aspects of the economy and the living conditions. Many production sectors will be directly touched: energy of course, but also manufacturing, transport, building and construction, tourism, and even agriculture (production of bio-fuels and, most interesting, the emerging phenomenon of "zero-km-agriculture", due to revitalize in a sustainable way many peri-urban areas). A number of new technologies will emerge during the coming 15 years which will have significant impacts on the economy, especially in the fields of energy production and use, including the processing of biomass, nanotechnologies, biotechnologies and transport systems.

The emergence of the green-economy paradigm will provide a relevant part of the new source of aggregate demand, desperately needed at the international scale; and consequently new jobs in advanced but threatened countries and a reduction in dependency on fossil fuels. In brief, it may boost a revival of endogenous growth in Europe.

The perception of these structural changes, and consequently the speed of the international recovery, is hypothesized in the reference scenario and important changes will happen, but policies will not act in an effective way.

In the reference scenario, the profitability of renewable energy increases, but political support is insufficient to generate a radical change of the energy paradigm. The progress of renewable energy sources remains dispersed and fragmented, with low synergy effects. The economy hardly benefits from this process.

In general terms, metropolitan areas with advanced economic functions and technological poles will be favoured with respect to cities with an economy depending upon intermediate or low technologies. After recovery, tourist functions

will progress moderately. The residential economy progresses because of accelerating population ageing in Europe. Rural areas will be affected, up to a certain extent, by the deregulation of the Community Agricultural Policy (CAP), especially the wine producing regions. A number of rural areas will benefit from the production of renewable energy, but only a modest part of the available potential is being exploited. Immigration concentrates in metropolitan and tourist areas.

Growing oil and gas prices favour investments in oil and gas exploration and discovery. The Arctic region becomes a strongly targeted region in this respect. Regional tensions and possible conflicts are not excluded. The expansion of nuclear energy is constrained by the progressive depletion of uranium resources. The profitability of renewable energy increases, but political support is insufficient to generate a radical change of the energy paradigm. The progress of renewable energy sources remains dispersed and fragmented, with low synergy effects. The economy hardly benefits from this process.

7.3.1.1 Territorial Aspects of the Reference Scenario

The catching up process of the economies of Central and Eastern Europe continues, but at a significantly lower speed than before the economic crisis. It is also more differentiated among the countries concerned. Despite this process at macro-scale, regional disparities are likely to increase within the EU at a lower scale. The two-speed Europe is accentuated, with advanced economic functions concentrating more and more in metropolitan regions. New manufacturing activities also concentrate in well-developed regions. In addition to main metropolitan regions, second-rank cities and metropolitan areas are also beneficiary. Regions most affected by the crisis are mainly manufacturing regions with low or intermediate technologies and a relatively high intensity of manpower, both in Western and Eastern Europe.

Other regions affected by the crisis and where recovery will prove difficult are those which had, up to the crisis, booming activities in the sector of building and construction. Lasting difficulties may also affect regions where economic growth before the crisis was largely based on financial speculation and related financial services or on specific fiscal niches. Numerous tourist regions have also been affected by the crisis, but tourism is very volatile and the recovery of these regions will depend upon the general level of the European economy. The evolution of rural areas will be contrasting and heterogeneous, with a number of rural regions being affected by the deregulation of the CAP and trade liberalization in the context of the WTO, others benefiting from the opportunities of biomass and renewable energy production.

The regions where demographic factors may act as a constraint on the regional labor markets are those where the economic recovery is substantial in a context of rapid population ageing. Immigration further concentrates on large cities, generating a low cost housing market at their periphery. It is also substantial in tourist areas and in areas attractive for the retirees. In these regions, it favors the increase of fertility rates.

7.3.2   The Pro-active Scenario

The pro-active scenario is based on the assumption that the decisions adopted at international level aiming at curbing down the speed of climate change are efficiently used as an opportunity to generate significant economic growth throughout Europe. The implementation of the scenario requires the active involvement of economic actors and of the civil society. A wide spectrum of sectors—manufacturing, energy, construction, agriculture, transport, R&D and advanced services—will benefit from the spread of the new "green economy paradigm"; aggregate demand will benefit from new investment opportunities. The perception of changes brought about by the economic crisis is clear, and changes even anticipated; the capacity to pro-act by macroeconomic, industrial and legislative policies is large.

This pro-active scenario for Europe is part of a more global context in which the large emerging countries are pulling up the world economy while moving towards more technology-intensive activities. The international financial order is stabilized by the diversification of currency reserves, the dollar having lost its monopolistic position.

Economic growth is stronger and recovery more rapid than in the reference scenario. It is not limited to Europe, but includes also the USA and Asia. The more developed economies and also the BRICs invest in less-developed countries, especially in Africa, Latin America and Southeast Asia, in order to develop the local markets and to create demand, which is just the opposite of a protectionist attitude.

In Europe, the strategy consists of increasing significantly technological investments boosting productivity, but generating in a first stage higher unemployment rates. Only after a period of 5–7 years, employment is growing again. Higher skills and qualifications are required. The race for stronger tertiarization is being attenuated thanks to a rapid development of the "green economy" which creates jobs both in R&D and in manufacturing activities. Services move towards higher added value segments. In the context of a more regional globalization, higher financial services are being re-centered on Europe. Through higher competitiveness and stronger public support, European enterprises are less in danger of being taken over by non-European groups or sovereign funds.

The concretization of the "Green Economy" is far from being an easy task. Numerous local authorities choose to take action in relation to climate change, but their resources are limited by the impacts of the economic crisis. The potential investments of SMEs are constrained by difficulties in obtaining bank credits. The transition from carbon-related energy systems towards a new energy paradigm based more largely on renewable energy sources is affected by the levels of necessary investments and by constraints of profitability. The international harmonization of policies is also a difficult issue which generates distortions.

The progressive emergence of new economic growth and the creation of significant amounts of new jobs after a few years generate however trust in the strategy related to the "Green Economy", so that more and more businesses and households

invest, with encouraging returns on investment. This leads to a mass effect which ensures sustained economy growth and strengthens social cohesion.

In the demographic sector, fertility rates are subject to a revival, favored by the positive economic evolution, but their impact remains a long-term one. The shortage of population of working age in a growing number of regions favours the immigration of qualified manpower.

7.3.2.1 Territorial Impacts of the Pro-active Scenario

The territorial impacts of the pro-active scenario change somewhat over time. During the first phase (5–7 years) growth is concentrated on metropolitan areas. In a second stage, production activities related to the "green economy" diffuse towards cities of second and third level and also towards regions of central and Eastern Europe as well as towards the more peripheral regions of Western Europe. Therefore, the scenario favors, in the long run, a higher degree of polycentricity of settlement structure than the reference scenario.

In addition to economic aspects, the adoption of the Green Economy has important impacts on the morphology and organization of cities. More compact urban forms are being developed in order to take advantage of the expansion of public transport networks. Urban expansion remains however more contained and compact than in the Reference scenario, the greening of cities and the further development of ICT limits the motorized mobility for working and leisure purposes. Favorable economic development has a positive impact on social cohesion.

A significant number of rural areas benefit from the "green economy". The positive economic climate favors the development of the residential and tourist economy which is beneficial to small and medium-sized cities as well as to rural areas with an attractive natural and cultural heritage.

7.3.3   The Defensive Scenario

The defensive scenario assumes a slow recovery from the crisis in western economies and Japan, resulting from a weak reactivity to the changing context and a lower perception of the new technological opportunities. Global demand remains modest. In the USA, domestic demand is much weaker than before, because households put higher priority on savings than on consumption. The BRICs maintain their comparative advantage in low-cost production. They however progress also in more technology-intensive sectors, competing more intensely with Europe. Few foreign investments are made in the less developed countries of the world. Inflation is lower than in the reference scenario because of low wage policies in Asia with global deflationist impacts. Low interest rates feed new speculative bubbles, threatening the stability of the global economy. Maintaining the dollar as the only reserve currency works in the same direction.

In this scenario, changes brought about by the crisis are not fully perceived by economic actors. The general attitude will be a defensive one, protecting existing

structures, sectors and firms; development assets will be more similar to the past, and risks of low development rates higher.

Europe does not enter the new technological paradigm and fails to modernize significantly its productive activities. Because of insufficient public support and modest mobilization of economic actors and civil society, the Green Economy cannot make a breakthrough. Service activities do not significantly qualify.

In the medium range (5–7 years) European exports are maintained, but they comprise a large share of products with modest added value. Employment is artificially protected in the medium range and the situation worsens afterwards because of insufficient competitiveness in the global context. Cost-competitive policies are maintained in central and eastern Europe in order to attract FDIs. Their impact is however limited. Exports are slowing down and unemployment increases. More European businesses are taken over by non-European groups. When profits of such businesses are declining because of the lack of investments in R&D and in productivity improvements, they are left out by the new owners. The European population declines in the long-range, the natural evolution being negative and immigration being strictly controlled.

7.3.3.1 Territorial Impacts of the Defensive Scenario

In the medium range, changes in the regional patterns are modest. The catching up process of Central and Eastern Europe is however significantly affected by the fall of FDIs after the crisis of 2008/2009. The European settlement pattern is not significantly modified.

Important territorial changes take place however later on. The competitiveness of a number of activities in the sectors of agriculture, manufacturing industries and services is then declining because of insufficient adjustments and productivity-related investments. Most affected regions are those with fordist and neo-fordist manufacturing activities. A significant number of rural regions are confronted with serious problems of decline of yields from agriculture and loss of jobs in small, no more competitive manufacturing industries. The non-emergence of the Green Economy hinders the development of alternative activities in the production of renewable energy. Investments in this field remain dispersed and insufficiently profitable. The depressed economic situation does not favor the development of the residential, patrimonial and tourist economy in rural areas. The result is that outmigration from numerous rural regions intensifies, not only in central and eastern Europe. Population ageing increases significantly and demographic decline affects numerous rural regions in the long-range. The differentiation of rural areas accelerates.

New service and manufacturing activities concentrate mainly in and around metropolitan areas in order to minimize risks. There is not sufficient economic potential and elasticity in the economy for a more polycentric development of settlement systems. Interregional migrations, which are more intense than in the reference scenario, favor large cities. Medium-sized and smaller cities not under metropolitan influence and strongly dependent upon manufacturing activities, are particularly affected. The internal evolution of metropolitan regions is raising

concern. Urban sprawl accelerates under the influence of growth of population and activities and also of growing social tensions in the core cities. Social segregation, insecurity and criminality are growing in inner-city areas and densely populated suburbs, where unemployment is significant. Traffic congestion increases and the share of non-polluting cars remain low.

7.3.4 Expected Economic Performance Trends

After crisis scenarios have been presented, starting from the contradictions that characterised the world economy in the recent past, and that are mostly responsible for the present crisis.

One can speculate on the intensity with which structural changes will take place; however, most of them are already in place, and for this reason a plausible "trend" scenario is not meaningful. A "reference scenario" taking into account a number of recent structural changes in addition to more long-term evolutions seems more appropriate; this scenario will register the effects of the structural breaks leading to a permanent loss of wealth, with growth starting again from this eroded base. Figure 7.1a presents this logical expectation.

Against this background, the capacity (or incapacity) of the European economy to take advantage of the new global situation and its internal potentialities can be anticipated in the form of two contrasting scenarios. In particular:

– a scenario in which these structural changes are perceived and even anticipated, and where the capacity to pro-act and re-act is large; this scenario is expected to enable Europe to make a full return to an earlier growth path and raise its potential beyond pre-crisis output levels (Fig. 7.1b);
– by contrast, a scenario in which these changes are not fully perceived by economic actors, anchored to the traditional development assets, thus risking low development paths and a permanent loss in wealth (Fig. 7.1c).

In aggregate terms, these expectations of ours are totally in line with the ones proposed by the European Commission in the *Europe 2020* Report (CEC 2010), bringing in our opinion a new rationale and justification to them.[5]

Our expectations based on qualitative thinking require empirical validation, both in aggregate terms and at a territorially disaggregated level of analysis. This step is achieved by running simulations through the econometric MASST model, able to produce tendencies and behavioural paths of regional GDP at European NUTS2 level under alternative assumptions.[6]

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[5]In the *Europe 2020* Report the three growth paths are labelled respectively as "Sluggish recovery", "Sustainable recovery" and "Lost decade" (CEC 2010, p. 7).

[6]For the assumptions used in the three scenarios, see Appendix 2.

a)

b)

c)
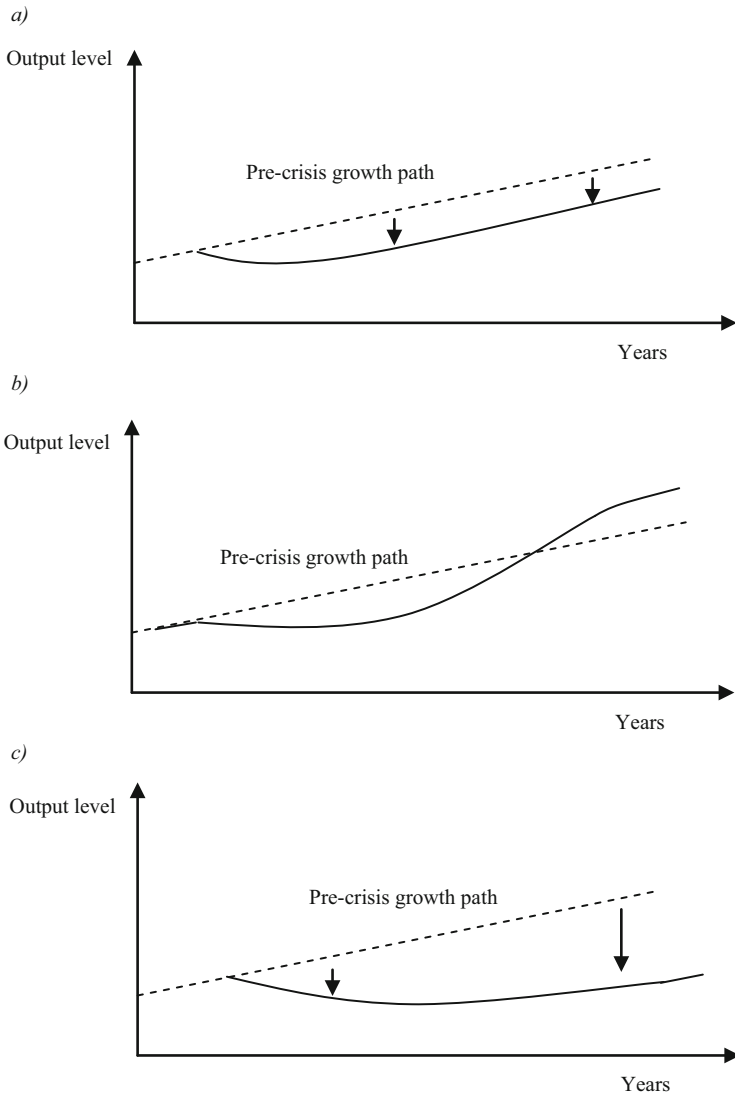
Fig. 7.1 Alternative growth paths out of the crisis: logical expectations. (**a**) reference scenario, (**b**) a pro-active scenario, and (**c**) defensive scenario. Source: Capello et al. (2011), elaborations on CEC (2010)

7.4   Aggregate and Regional Results

Figure 7.2 reports the aggregate per capita GDP level from 2010 to 2025 forecasted by the model in the three scenarios presented above, compared to a baseline scenario which extrapolates the recent pre-crisis trends without taking into consideration the structural breakdown generated by the crisis itself.

In line with our conceptual expectations, the reference scenario shows a lower GDP per capita trend with respect to a scenario in which the structural breakdowns are not taken into consideration (Fig. 7.2a); when the latter are perceived, and even anticipated by policy makers, the capacity of the economic system to grow is much higher than in a "baseline" scenario (Fig. 7.2b). The defensive scenario, in which economic actors and governments do not adjust their behaviour to these structural changes, shows a much lower per capita GDP trend than the baseline scenario (Fig. 7.2c).

Interestingly enough, these aggregate results show a strong regional difference. In the reference scenario, GDP growth rate is positive for almost all regions, but some regions considerably outperform while in others growth looks sluggish. Results indicate that growth within countries will be mainly a centripetal process, with core areas as leaders in all countries. Many second rank areas are also thriving, whereas all rural areas are sluggish (Map 7.1).

In Eastern Europe all capital regions, such as Budapest, Sofia, Warsaw, are among the best performers overall, sometimes (as is the case of Prague, Bratislava and Bucharest) also pulling the regions just around them. Rural areas in the East are on the contrary severely hit, similarly to all rural areas around Europe, being affected by the deregulation of CAP and increased international competition.

In the West, first ranking regions are those which generally outperform the others, as shown by the performances of areas such as Stockholm, Copenhagen, Munich, Frankfurt, Brussels, Lisbon, Athens. However, second order areas are also thriving, as shown by the examples of Malmo, Hertfordshire, Edinburgh, Gent.

This pattern is confirmed in what is called the "Latin Arc" (Spain, France, Italy). The highest growth rates within their respective countries are experienced by Ile-de-France, Lombardy, Madrid and Catalonia, but very high growth rates can also be found in second order regions such as Valencia, Rhône-Alpes, Piedmont, Emilia-Romagna. The performance of Languedoc-Roussillon is intermediate, being the outcome of differentiated internal areas.

The pro-active scenario is more expansionary for all regions of Europe (results are not shown here). In the New Member Countries, the areas which are more able to perform a technological leap forward are the core and capital ones. Instead, among Old Member Countries, a number of second level and intermediate income areas show relevant growth rates.

Therefore, and interestingly enough, especially in the West, not necessarily the core regions benefit from the stronger general growth climate, but rather a number of second level areas. For example, Poznan in Poland, a large number of intermediate regions in Germany, Bruges and Gent in Belgium, Porto in Portugal, all
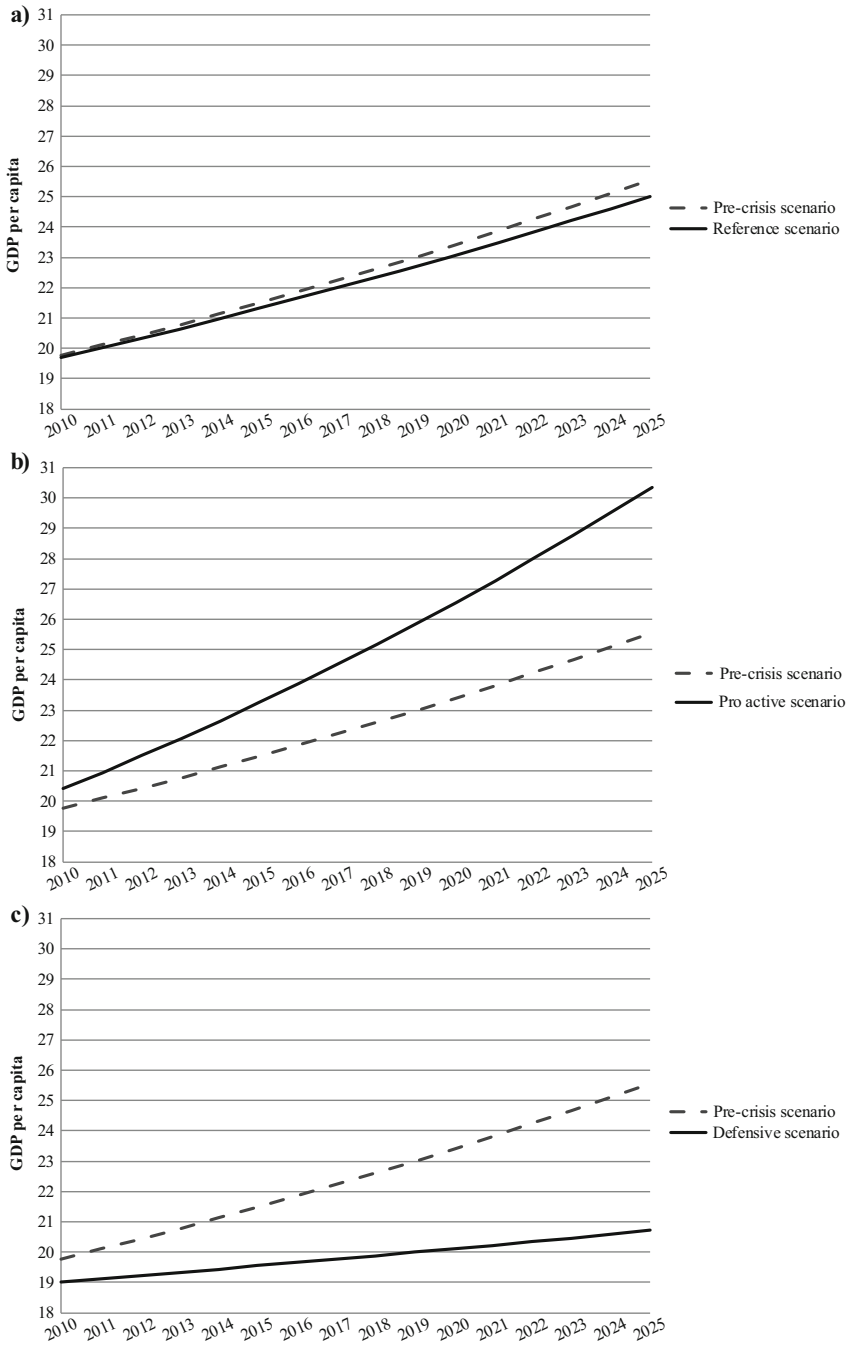
Fig. 7.2 Alternative growth paths out of the crisis: a quantitative analysis. (**a**) reference scenario, (**b**) pro-active scenario, and (**c**) defensive scenario. Source: Camagni and Capello (2011)
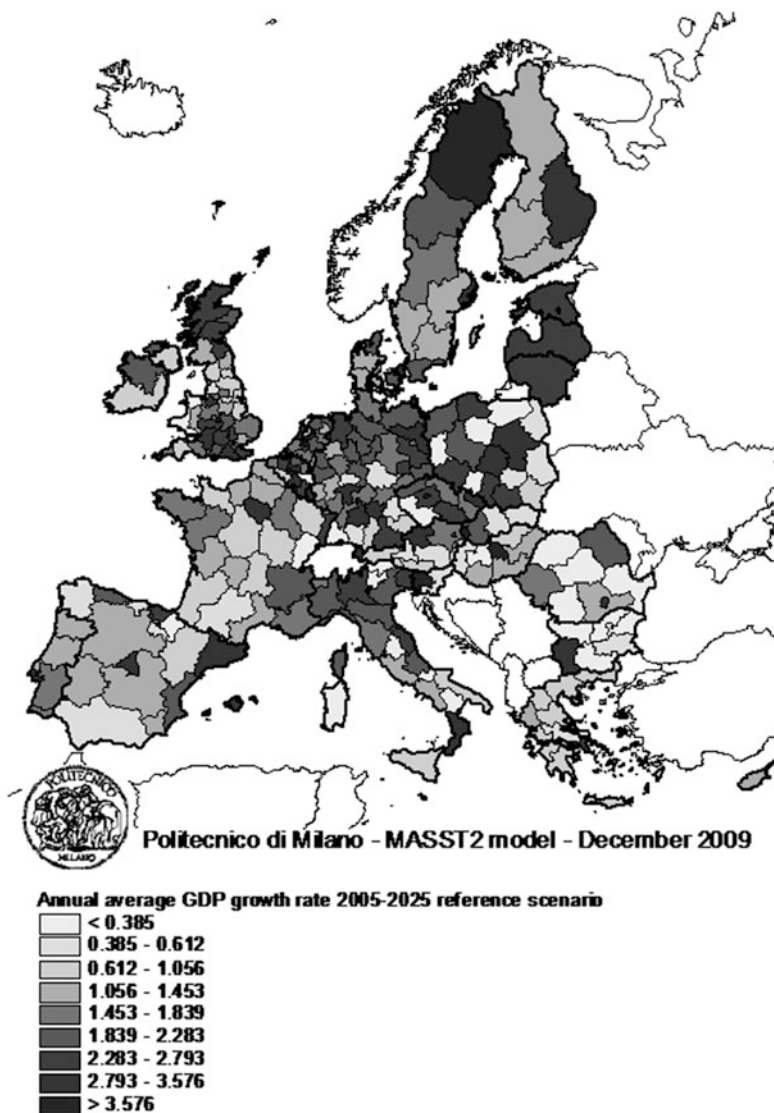
Map 7.1 Annual average regional GDP growth rates in the Reference scenario (2006–2025)

register a difference of annual GDP growth rate with respect to the Reference scenario which is higher than their respective capitals.

In the defensive scenario, due to lack of aggregate demand, insufficient investment and decline of manufacturing, rural and intermediate income areas are those which lose more, whereas capital regions are more able to survive the hard times; growth rates in this scenario are significantly higher in Eastern metropolitan regions.

The total level of regional disparity in Europe increases in all three scenarios, but especially in the defensive one as only the most important metropolitan areas are able to react and the weakest countries suffer the most from the general protectionist attitude.

7.5 Policy Suggestions

7.5.1 Short and Long Term Policies

One of the most relevant efforts in economic policy making for the years to come concerns the strengthening of the link between short and long-term interventions, to be achieved through what are increasingly called "smart investments". The general aim should be to revitalize internal demand while at the same time boosting local and national competitiveness (and controlling for excessive public budget deficits).

On a scenario time span reaching 2025, the necessary structural policies become central, and in fact they represent a constituent and consistent part of the scenarios that are presented. Even in the reference scenario, they are present in the form of some support to the emergence of a new production paradigm, namely the "green economy" one, orienting in a consistent and synergic direction both public and private investments.

But linking short and long-term goals and tools is not the only request for effective economic and structural policies. A similar consistency is requested among the actions of different government levels, from Community to national, regional and local. This goal can be achieved through explicit coordination efforts ("multi-level governance") or implicit synergetic behaviour, each policy layer operating with its own instruments and inside its own competences with a full complementary attitude. This requested cooperative behaviour implies, in operational terms, two main elements: a strong permeability between policy layers, and the relevance of local policies, acting on the different aspects of territorial capital and implemented through inclusionary processes of vision building and project elaboration.

7.5.1.1 Demand Policies

The most urgent part of demand policies concerns the design of an exit strategy from the present deficit of Member States budgets, reducing reliance on public expenditure. Direct public intervention through public demand should be substituted by less expensive, indirect public expenditure—e.g. in the form of incentives to private demand—or by appropriate regulatory policies, with the aims to:

– create new sources of aggregate demand, like the opening up of new international markets in developing countries, is a second task;

– support the launching of new production paradigms, implying multiple techno-
logical advances, multiple applications in a wide array of sectors, multiple
possibilities of product innovations;
– conquer new internal and international markets through enhanced competitive-
ness of local production;
– use in a smart way the existing public procurement of goods and services,
although due to shrink, for the creation of an initial market for advanced,
environment friendly products, in the building and construction field, in
advanced telecommunication networks and services, in the provision of many
e-services like health, social assistance, e-governance in general.

7.5.1.2 Supply Policies

Different tasks are assigned to supply policies. The first is that supply policies
mainly concern the efficiency and innovativeness of the production fabric, which,
on its turn, depends widely upon national context elements but also, and particu-
larly, upon local context elements.

The second task assigned to these national, supply-side policies concern wide
investments with an inter-regional interest. An important case was found during this
research work: the transport integration of the Latin Arc regions. In fact, the
western Mediterranean macro-region, in spite of the many common characteristics
and the sharing of the sea resource, still shows a striking fragmentation in terms of
mobility infrastructure (and consequently, in terms of economic integration). The
case is also present for exploring deeper inter-regional co-operation, in the form of
the creation of "synergy networks": between ports, with a commodity and branch
specialization; in the spheres of tourism, building integrated "itineraries" in both
maritime cruise and city/cultural tourism; among knowledge centres, for coopera-
tion in R&D and advanced education.

7.5.2 Regional Policies: Territorial Capital and Territorial Platforms

Another relevant case for supply-side policies implies important responsibilities for
regional and local governments: the accumulation and best utilisation of "territorial
capital", as indicated by an important statement of DG Regio of the EU Commis-
sion, still not sufficiently elaborated both by the scientific and the operative policy
milieu (European Commission 2005, p. 1).

The concept of territorial capital was first proposed in a regional policy context
by the OECD in its *Territorial Outlook* (OECD 2001). For the sake of simplicity,
we may mention four large classes of territorial capital elements (Camagni 2009):

– *infrastructure capital and settlement structure*, encompassing also the
characteristics of the urban system and the quality of the environment;
– *cognitive capital*, in the form of knowledge, competence, capabilities, educa-
tional and research structure, embedded in both productive capital and human
capital;

– *cultural and identitarian capital,* encompassing cultural heritage, landscape and natural capital;
– *social and relational capital,* in the form of both civicness and associative capabilities.

Acting on territorial capital in policy making means acknowledging the integrated nature of any policy strategy, the added value on intervening on different but linked localized assets at the same time, promoting network relations and supporting innovative projects emerging thanks to these relations. The main messages reside in the necessity to better integrate the traditional spatial development policies into each territory, through an harmonious merging of material and non-material elements, functional and relational assets, economic, social and environmental aspects; to create new cooperation networks among local actors and willing and cohesive local communities; to focalize on excellence assets in the spheres of knowledge, culture, natural and cultural heritage, and support innovation through synergetic behaviour.

This integration strategy could be properly synthesized and made operational through the concept of "territorial platforms". Intervening through territorial platforms means exactly to aim at a full integration—in physical, economic, social and aesthetic terms—of new development projects into the local realm. Three main "platforms" are proposed here: *infrastructure platforms, knowledge platforms and identity platforms.*[7]

7.5.2.1 Infrastructure Platforms

New infrastructure platforms will allow the achievement of some basic priorities: improving the internal integration of entire macro-regions, especially those across national borders; boosting external accessibility of each region with respect to external territories, in order to achieve enhanced competitiveness and attractiveness; reaching a higher internal efficiency of large metropolitan areas through a polynuclear urban structure. This implies better and integrated rail network in many regions and the use of new "highways of the see" (e.g. in the Mediterranean regions); improved linkages of large metropolitan areas with the main European corridors; new orbital railway systems internal to the main metropolitan regions, in order to boost accessibility of second rank subcentres and avoid sprawl (e.g., in the Paris, Barcelona, Milan metropolitan regions).

7.5.2.2 Knowledge Platforms

Knowledge platforms represent systems of cooperation networks between the main actors of the knowledge society: advanced research institutions, high education institutions, advanced and dynamic firms. Local firms are not only the recipients of the output of the specialised knowledge plexus (institutions working on scientific

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[7]For an operational application of this concept to the case of the Latin–Mediterranean regions, see the ESPON project quoted in footnote 1 and Camagni and Capello (2011).

and applied research), but are the carriers of long standing local production competence and know how, and therefore they represent a crucial partner in any innovation and technological advancement strategy. Particular attention should be paid by policy makers not just to achieve fruitful cooperation between these three local actors (in line with the up-to-now successful experience of the French "*pôles de compétitivité*"), but also to monitor the persistence of local production knowledge which could be jeopardised by a too fast delocalisation of sensitive parts of the production *filières*.

Knowledge platforms may be structures through:

– the synergy and cooperation between the above-mentioned main actors of the knowledge society into what may be called the local "competence poles";
– the inclusion of innovative firms in these cooperation agreements, working on the industrial "vocations" and the specificities of territories;
– the development of other *filières*, linking excellence local natural and productive assets with knowledge and competence poles. The agri-food-tourism *filière* supplies huge potential benefits. Similar virtuous circles refer to the health and wellness *filière*, linking local know-how in medical technologies with the increasing specialisation in wellness services and accommodation facilities for an increasing population of European retirees;
– an increasing engagement in the different fields and niches of the green economy paradigm (bio-mass and solar energy production, energy technologies and research, energy-friendly buildings).

7.5.2.3 Identity Platforms

Identity platforms exploit natural wealth and local cultural heritage for the development of new economic and employment opportunities. Local identities may become effective "brands" for new, selective and sustainable forms of tourism, but also for the advertising of ancient local competences embedded in food and wine productions and in local handicraft products. An integrated strategy for linking up all the preceding elements with new physical accessibilities, careful site information, worldwide marketing and enhanced logistic receptivity may prove extremely effective.

Local identities have to be re-discovered and interpreted on a wide area level; single pieces of cultural heritage have to be linked with each other in larger and consistent "itineraries", integrated in both information and logistic terms, in order to reach appropriate critical mass and new visibility on the international tourist market.

7.6   Conclusions

The present economic crisis is analyzed by highlighting the huge contradictions that emerged in the recent past, and the structural changes that will take place as a result of the crisis: the debt-driven aggregate demand in advanced countries, widely

responsible for the emergence and sudden explosion of the real estate bubble; the financialization of western economies; the strange evidence of new emerging countries like China not only supporting western and real incomes with a wide supply of low-price goods, but also supporting western (and particularly the U.S.) balance of payments. All these elements have to change in the long and are already changing.

Reflections on future scenarios are based on the way these structural changes will be perceived and dealt with by policy markers. Three different scenarios are presented. The one which proves most expansionary is the pro-active scenario, in which policy makers perceive, accept and even anticipate such changes; its effects are not homogeneous on the European territory. Interestingly enough, especially in the West, not necessarily the core regions benefit the most; in fact, a number of second level areas register a relative annual GDP growth rate higher than their respective capitals, signalling a wider spatial diffusion of the economic advantages than expected.

In order to support the expansionary, pro-active scenario, strengthening the link between short and long-term policies is of vital importance, to be achieved through what are increasingly called "smart investments". The general aim should be to revitalize internal demand while at the same time boosting local and national competitiveness. Beyond that, renewed regional policies should focus on the strengthening of local territorial capital, through integrated measures addressed to what we call territorial platforms: infrastructure platforms, knowledge platforms and identity platforms.

Appendix 1: The MASST Model

National growth depends on the dynamics of the macroeconomic national elements: private consumption growth, private investment growth, public expenditure growth and export and import growth. This part of the model is able to capture macroeconomic (national) effects on regional growth generated by interest rates and public expenditure policies, trends in inflation rates and wages. These policies and trends differ radically among European countries (especially between the Eastern and Western ones).

In its turn, the *regional differential component* (the shift component, i.e. the relative regional growth) depends on the competitiveness of the local system, this being based on the efficiency of local resources: the increase in the quality and quantity of production factors (like human capital and population) in infrastructure endowment, in energy resources, as well as the sectoral and territorial structure of the regions and the interregional spatial linkages.

As a consequence of this double structure, MASST differs substantially from existing regional growth econometric models. These conduct direct interpretation of absolute regional growth either by replicating national macroeconomic models or by using complex systems of equations for each region that are linked to both the

national aggregate economy and the other regional economies through input-output technical coefficients determining intra- and inter-regional trade and output.

The first sub-model is a macroeconomic model applied to each of the 27 - European countries in our sample which is very similar to the standard macro-econometric models used by national governments and central banks as program-ming and policy support tools. MASST differs from these macroeconomic models in that only goods and service markets are specified within it, while the monetary market, the labour market, and the public sector budget receive no endogenous treatment. The national sub-model of MASST is therefore a partial equilibrium model in which prices, wages, interest and exchange rates, public spending are taken to be exogenous variables. If these characteristics of MASST can be regarded as a shortcoming, they nevertheless allow fairly simplified explanation of real growth as a function of policy tools (interest rates, exchange rate, government expenditure) or policy targets (inflation, unemployment) influenced by national or international macroeconomic trends.

According to the logic of MASST, the higher/lower relative capacity of a region to grow depends on its structural elements: its productive structure, its relative position, its accessibility, its settlement structure, its degree of economic and social integration—all elements that identify a particular economic trajectory of a local economy which may differ from the national one. Table 7.1 shows the blocks of equations that characterize the regional sub-model.

The first equation is the regional shift equation represented as a quasi-production function in a reduced form. It presents the factors thought to determine regional production capacity. These factors, which stem from both modern and traditional theories of regional growth, are the following:

– *industry and tertiary dynamics*, i.e. the increase in employment growth in the industry and in the tertiary sectors, capturing a sort of mix effect of the regional dynamics, demographic changes;
– *an intersectoral productivity*, stemming from structural features of the regions, like infrastructure endowment, accessibility, share of self-employment, quantity and quality of human capital, availability of energy resources, and the settlement structure of regions, measuring the advantages stemming from the physical organisation of the territory (agglomerated vs. dispersed regions).

Not all the explanatory variables are exogenous to the model; three of them are endogenous and allow for cumulative processes, namely (Table 7.1):

– the *dynamics of the industrial employment*, made dependent on the industrial specialisation of the region;
– the *dynamics of the tertiary employment*, made be dependent on the industrial and settlement structure of the region;
– *demographic changes* (population growth rate) are dependent on birth and death rates and on in-migration;

Table 7.1   Outline of the MASST sub-regional blocks of equations

1)	Dependent variable: *regional differential shift*	
	Independent variables: Industrial sector dynamics	Average increase of industrial employment (lagged with respect to the dependent variable)*
	Service sector dynamics	Average increase of service employment (lagged with respect to the dependent variable)*
	Intersectoral productivity:	– infrastructure endowment – share of self-employment – quality of human capital – population growth* – energy resources – human capital – rural vs. agglomerated vs. urban regions; – mega regions – spatial spillovers* – EU funds (strcutural funds)
2)	Dependent variable: *Average increase of industrial employment* Independent variable: Industrial specialization of the regions	
3)	Dependent variable: *Average increase of tertiary employment* Independent variable: Past industrial structure Settlement structure of the region	
4)	Dependent variable: *population growth* Independent variables:	
	Birth rates	Death rates	Net in-migration*
5)	Dependent variable: *net immigration* Independent variables:	
	Regional differential growth	Unemployment rate	Regions' settlement structure

Variables with * are endogenous variables in the model

– in its turn, *in-migration* is dependent on regional income differentials, unemployment rate, and on the different settlement structures of regions;
– the part of regional growth dependent on the other regions' dynamics (*spatial spillovers*) is dependent on the regional growth of neighbouring regions in the previous year.

The simulation procedure is based on seminal ideas about the driving forces of change and their (quantitative) impact on national and regional growth. In our methodology the quantitative impact is obtained by inserting the change in the values of the variables representing the drivers of growth in a quantitative econometric model developed for this purpose.

The output of the simulation procedure is represented by new values for the endogenous variables. These are calculated by the model at each run (i.e. at each year end) using the equations with the estimated coefficients in the model. There are 12 endogenous variables in total. All other variables are exogenous in the model and represent the levers used to produce different scenarios.

Table 7.2 Logics of the simulation procedure

Forecasts	Year t		Year t + 1 (and thereafter)*
Estimated national growth	A_t) Calculation of actual *national growth* with the national sub-model (output of MASST at time t)		A_{t+1}) Calculation of actual *national growth* with the national model, as a function of lagged potential growth (output of MASST at t + 1)
	B_t) Calculation of *regional differential shift* with the regional sub-model		B_{t+1}) Calculation of *regional differential shift* with the regional model
Estimated regional growth	C_t) Actual regional growth is calculated as the *sum of A and B*, where B is rescaled to have 0 mean within each country (Output of MASST at time t)		C_{t+1}) Regional growth is calculated as the *sum of A and B*, where B is rescaled to have 0 mean within each country (Output of MASST at t + 1)
	D_t) Potential regional growth is equal to the *sum of A and B* (non-rescaled) Potential national growth is equal to the increase in the sum of potential regional income levels in D_t		D_{t+1}) Potential regional growth is equal to the *sum of A and B* (non-rescaled) Potential national growth is equal to the increase in the sum of potential regional income levels in D_{t+1}

* The last year for which official statistics were available at the beginning of the estimations was 2002
Source: Capello et al. (2008)

Operationally, the generative element in the MASST model is taken into account in the simulation procedure as follows. In the first year of simulation (2007), a value for national growth is obtained from the national sub-model (point A in Table 7.2); at the same time a value for the differential shift is obtained from the regional sub-model (point B in the same table). The weighted average of regional shifts may be different from 0. However, because regional growth in an ex-post perspective is by definition redistributive, the new value of regional growth is obtained as the sum of the national growth and regional differential components, rescaled so that it is equal to the national value (point C). This represents the ex-post regional growth which is embedded in the national growth.

Thanks to this simulation algorithm, MASST can be definitely interpreted as a "generative" model: ex-ante regional growth rates play an active role in defining national growth. Ex-post, the national account identity is fulfilled.

Appendix 2: Quantitative Assumptions

The three tables below report for each assumption in each scenario the lever of the MASST model used in the simulation exercise. In particular Table 7.3a reports the assumptions for the reference scenario, Table 7.3b contains those for the pro-active scenario, and Table 7.3c those for the defensive scenario.

Table 7.3 The quantitative hypotheses of the MASST2 model in the three scenarios

(a) Reference scenario	
Reference scenario hypotheses	MASST hypotheses (with respect to the past)
Reduction of the amount of external FDIs into Europe	Reduction in the share of FDI on GFCF
The US dollar will lose its importance as reserve currency	Revaluation of Euro
Deflationary effect of Asia on world economies attenuated	Higher inflation rates with respect to the past
Recovery of some manufacturing activities in Europe, especially open ones	Increase in growth rates of open sectors and decrease in the others
A number of new technologies will develop: nanotech, biotech, transport technologies, new materials	Increase in growth rates of open sectors and decrease in the others
Aging and immigration in largest cities	Increase in death rates and decrease in birth rates, stronger in non agglomerated regions
Rising interest rates	Rising interest rates
Limited trade increase	Lower constant of import and exports
BRICs enter progressively in the medium and high technology game	High growth rate of BRICS
Increase in oil prices due to oil demand increase: new investments in exploration and discovery	Increase in energy prices
(b) Pro-active scenario	
Pro-active scenario hypotheses	MASST hypotheses (with respect to reference scenario)
BRIC countries also moving towards more technology-intensive activities with better paid jobs; deflationary effect of Asia on world economies disappears	Higher increase in BRICs growth rate
Recovery also in USA and Japan	Higher growth in USA and Japan
The dollar is no longer the sole reserve currency; it devaluates with respect to the euro	Euro revaluation
A more stable international financial order emerges	Only slightly higher inflation, despite high growth
Boosting technological investments and productivity in Europe	Lower unit labour costs
Higher skills and qualifications are required	Higher HRST, especially in strong regions
Increase in oil prices due to oil demand increase, partially counterbalanced by the development of the green economy	lower increase in energy prices
Advanced economies moving towards technology oriented activities, implementing resolutely the "green economy"	lower increase of energy consumption
Technological investments boost productivity; the unemployment rates increase further in a first phase (5–7 years) and decrease significantly afterwards	Higher unemployment rates, especially in weakest areas

Table 7.3 (continued)

Race towards stronger tertiarisation attenuated thanks to a rapid development of the "green economy"	
Investments from Europe and BRICs in poor countries (like Africa) will increase in order to create local markets Non-European FDI will slow down, but BRICs and Sovereign Funds investments will endanger competitiveness of EU	Lower FDI in Eastern regions
Impact of demographic change on (skilled) manpower shortage	Higher natality and lower mortality especially in weaker areas
(c) Defensive scenario	
Defensive scenario Hypotheses	MASST hypotheses (with respect to reference scenario)
Deflationary effect of Asia remains: inflation rate is lower	Lower inflation rate
The Euro does not achieve to become a reliable reserve currency	Lower revaluation of Euro
More European businesses are taken over by non-European groups, which means in a first instance more inward capital flows. These are however for short term profits and for appropriation of technology	Higher FDI in Eastern regions
In US the internal demand remains low, because households put a higher priority on savings than consumption	Lower growth rate of USA and Japan
BRICs maintain their comparative advantage in low-cost production; they however progress also in more technology-intensive sectors, competing more intensively with Europe	Lower growth rate of BRICS
Service sector is less qualified than in the reference scenario. Low profile tertiary activities such as call centres, dominate	Decrease of growth rate of open sectors and increase of base tertiary sectors
Loss of competitiveness of the European system in the long run	Lower increase of HRST
Less increase in oil prices; the increase is partially due to the use of traditional energy technologies	Lower increase in energy prices
The green economy cannot make a real breakthrough	Higher energy consumption
While employment remains relatively protected during the first phase (5–7 years), the situation worsens afterwards	Lower unemployment rates, especially weaker areas

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Part II

On Urban Economics

In Economics Not Only *Space* Matters, But Certainly Also Territory and Politics

<div style="text-align: right;">**8**</div>

Dénise Pumain

8.1 Introduction

The contribution of Roberto Camagni to urban economics is impressive and really original. In her introduction to this book, Roberta Capello underlines his "constant endeavor to highlight the active role of space in economic phenomena". I want to express a complementary line of argument from a geographer's perspective.

I will mention three among all possible reasons for celebrating the immense quality of Roberto's work: the first is related to economic theory; the second regards research practices; and the third is about commitment in society. I see here three opportunities to demonstrate not only the high compatibility of Roberto Camagni's research with the epistemology of geography, but also to highlight his role in placing economics at a right position within social sciences.

8.2 An Epistemology of Complexity in Social Sciences

When I first read Roberto's handbook on urban economy in its French version (Camagni 1992) what appealed me most was his adoption of a concept of intrinsic asymmetry in the exchanges between cities and their rural environment to explain the origin of urban land rent, urban accumulation and further agglomeration economies. Far from reducing the urban economic theory to an application of general market economy principles, this approach opens a way towards the complexity of an urban object that cannot be reconstructed from the theories of a single disciplinary approach (the necessary combination of fundamental concepts from different disciplinary fields for identifying any object would be to me a possible definition of the complexity of societal systems). The asymmetry is imposed on the

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terms of trade regulating the exchanges because the city is also a place where a diversity of sources of social power is concentrated. Such diversity enables the stakeholders to take a systematic profit from exchanges with others (for instance through fixing an unequal price to products, lower for agricultural goods from the countryside and higher for craft and manufactured goods that are produced in the city). A consequence is that, even in its economic definition, a city cannot emerge from pure economic principles only but also derives from sociological, political, cultural and economic processes.

Although more difficult to formalize—but also more interesting—the approach of this handbook seems to me more promising and superior to the Fujita-Thisse approach to urban economics. It is in that sense that I can rejoin the critical assessment made of so-called New Economic Geography by Roberta Capello (2005): "*In these approaches (New Economic Geography), what misses is the most interesting interpretation of space as additional resource and autonomous production factor of development*".[1] "Space" in Roberto's vision is not limited to geography as a container of human activity but encompasses the fertile concepts of innovative *milieu* and the proactive behavior of entrepreneurs and stakeholders in territorial competition as well as the political forces that are aggregated in territorial units at various spatial and temporal scales.

As a result, Roberto Camagni enriched and somehow "invented" the concept of a "territory" as integrated into economic theory by defining the territorial capital, including not only "the material and immaterial factors reducing the transaction costs" generated by proximity interactions but also the "social relations and social learning processes" and the "local governance system" which provide a territory an absolute and not only comparative advantage in the territorial competition (Camagni 2002; Chap. 5 in this book). In this paper, Roberto argues against Paul Krugman and insists again on asymmetries in the globalization process and on the "*intrinsic openness [of local territories] both to the movement of goods and movement of factors*" (ibid., p.15). He clearly assumes a non linear perspective for regional and urban dynamics that he was able to translate into simulation models of territorial agents (Camagni et al. 1986; Chap. 9 in this book). Thus the research developed by Roberto Camagni comes very close to the concepts investigated in evolutionary economics, when considering urban cycles and profit-rent dynamics as fundamental processes. Especially, his conception going "beyond optimal city size" (Camagni et al. 2013; Chap. 13 in this book), although remaining fundamentally rooted in economics, assumes "structural adjustments" after urban growth including shifts towards higher order functions and growing external linkages that could reduce the gap between urban economics and a geographical evolutionary theory of urban systems (Pumain and Reuillon 2017).

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[1]The original version is in Italian: "*In questi approcci (New Economic Geography) manca l'interpretazione più interessante dello spazio come risorsa aggiuntiva e fattore produttivo autonomo dello sviluppo*" (Capello, 2005, p. 147).

8.3   The Empirical Research in Practice

Regional Science emerged among social sciences as a specific branch derived from economy, because econometrics and economic theory since the end of nineteenth century had abandoned the political economy as well as the territory. The largest merit of the Italian school in Regional Science is to never forget about politics and territory when acquiring and formalizing knowledge in the field of regional and urban economics—too often excluded from theory by other schools.

Another merit of the research impulse given by Roberto Camagni is to reserve the right place to empirical observation when producing and testing theoretical hypothesis. To my knowledge, he is among the rare scholars having tried to inject observed measurements of urban costs and employment growth in dynamic models (Camagni et al. 1986; Chap. 9 in this book). He was also a pioneer in launching a systematic empirical investigation to assess the real costs and benefits of the large movement of urban sprawl through combining environmental and social indicators in a diversity of types of urban settlements on the example of Milan metropolitan area (Camagni et al. 2002). Too many further discussions about compact cities and the costs of peri-urbanization in Europe were made during the last decades without similar efforts of observation.

Roberto Camagni and his colleagues applied the same careful attention to empirical observation when they tried to define a "territorial impact assessment" for instance in order to measure the impact of transportation policies in Europe (Camagni, 2009; Chap. 20 in this book), or to assess, model and predict the urban and regional growth trends in Europe (Camagni et al., 2015; Chap. 7 in this book). The attention to the value of territories is made more acute by the challenge of deriving from sound scientific results a responsible advice to the local, regional, national or international planning agencies trying to repair the trends toward enlarging regional and urban inequalities or to anticipate the next urban and regional developments.

8.4   A Citizen-Scientist Involvement

Roberto Camagni deliberately involved himself in territorial action parallel to his academic career, probably following a research driven intention to check about the applicability and validity of scientific principles and results on the policies aiming at governing the evolution of territories. He acted at national level as well as internationally, for instance as Head of the Department of Urban Affairs at the Presidency of the Council of Ministers in Rome, as counselor to the French National Planning Agency (DATAR), at the DG Regio in Brussels at European level and for OECD.

Roberto actively participated in the institutions where urban and regional economics were confronted to challenges he wanted to take up as a scientist, with a strong concern and a high consciousness about the huge responsibility for contributing to a more clever and adapted local governance: "*Particularly in the*

present techno-economic phase, witnessing the increasing importance of knowl-edge factors, of immaterial elements linked to culture, taste and creativity, the innovative utilization of the existing stock of codified knowledge and technologies requires greater investments in tacit knowledge, human capital, management and organization, co-operation and networking; in a word, it requires conditions that are rare and not at all ubiquitous". He also insisted that "*the way towards territo-rial competitiveness, engaging public administrations and local communities in the creation of a widening spectrum of "preconditions" – from hard to soft, from competitive to cooperative ones – does not mean at all a wasteful zero-sum game*" (Camagni 2002, p. 19; Chap. 5 in this book).

Certainly, such a balanced, optimistic and engaged voice is difficult to convey to international audiences within the contemporary context of power relationships. I was honored to participate in the meeting hold in Firenze in 2009 for celebrating the 30th anniversary of the creation of the Italian Association of Regional Science in 1980 (after an Italian section of the RSAI was set up at the initiative of Walter Isard in 1969 in Rome). In this occasion I underlined the biased vision that was given in 2004 by the RSAI journal *Papers in Regional Science* which celebrated the 50th anniversary of that international association (Golden Anniversary Issue 2004). In this journal very little mention was made of Italian contributions to urban and regional science, although Roberto Camagni (during the 1980s) and Roberta Capello (during the 1990s) were well acknowledged as «intellectual leaders». However, while Philippe Aydalot, Claude Ponsard and François Perroux were cited among authors of path-breaking books, no mention was made of Camagni's *Economia urbana*. This could perhaps be due to a non-conventional and too revolutionary approach to urban and regional economics. In my speech I dared to claim that "*The Papers convey a biased parochial view with a competitive and accounting concern that is not shared in our Southern European culture. To my view, the strength of Italian Regional Science is to maintain itself outside and ahead of the «mainstream»*"". I am pleased to notice that since that time the situation changed at international level; the recognition of the Italian school and of its heterodox approach came with the designation of Roberta Capello as Editor in chief of the Papers.

8.5   Conclusion

From my position this short text is a far too modest contribution to the expression of the immense gratitude deserved by Roberto Camagni's scientific work that is fortunately more developed in other chapters of this book. I want to thank him especially for his remarkable mind openness, enabling to re-establish economy as a social science. He chose an open academic posture: not open to mainstream theories, but rather open to empirical observation and experimentation, to other scientific disciplines, to action in the civil society, and to our responsibility in a rapidly changing urban world. This has been my feeling since long ago, when we first met in the summer school that was held in the marvelous small Italian town of

San Miniato in July 1982. The meeting was founded by the NATO and organized by Dan Griffith and Giovanni Rabino. During two weeks, the scientific and friendly exchanges among architects, economists, physicists, mathematicians and geographers were so fruitful for the future development of regional and urban science that a list of names of the participants is enough, first for reminding so good memories and genuine intellectual excitement and second for drawing what would become the research agenda of the four next decades towards a better appraisal of urban complexity: by alphabetic order, Cristoforo Sergio Bertuglia, Roberto Camagni, Leslie Curry, Dimitrios Dendrinos, Lidia Diappi, Dan Griffith, Günter Haag, Giorgio Leonardi, Silvana Lombardo, Bernard Marchand, Peter Nijkamp, Silvia Occelli, Denise Pumain, Giovanni Rabino, Aura Reggiani, Lena Sanders, Wolfgang Weidlich and many others. . .

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Urban Growth and Decline in a Hierarchical System: A Supply-Oriented Dynamic Approach

9

Roberto Camagni, Lidia Diappi, and Giorgio Leonardi

9.1   Introduction

Traditional and modern approaches to urban development exhibit a natural tendency to cluster around a few consolidated theoretical 'trajectories', that are highly characterized in terms of methodology or field of inquiry. This tendency, which on the one hand facilitates the self-perpetuation of traditions or schools of thought and the progressive sophistication of theories and models, is responsible on the other hand for the paucity of new approaches to the problem and, above all, for the weakness of linkages among the different approaches.

Thus, in spite of the evident interdependence of spatial phenomena, diverse aspects of urban growth have been studied 'per se' and insufficient efforts have been devoted to integrating the different theories into a unified or even 'eclectic' model (Wilson 1983b).

We refer mainly to the central-place model of urban hierarchy, to the theoretical and empirical inquiries on optimal city size, to the export-base urban multiplier models and the spatial counterpart of the 'product life-cycle' and 'filter-down' hypotheses, to the theory of the inter-urban diffusion of innovation and the urban life-cycle model. All these approaches, taken separately, have almost exhausted

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their heuristic possibilities, but they may possibly supply new insights through the 'cross-fertilization' of their respective theoretical bases.

While based upon a dynamic approach and representing true methodological innovations, the most interesting recent models of urban growth, by Allen and Wilson (Allen and Sanglier 1981; Allen 1982; Wilson 1981; Diappi 1983), suffer from a disease similar to the above in terms of underlying economic theory.

The fascinating routes that they open reside mainly in the fact that they highlight the possible alternative paths of development for the urban system, thus adding 'new perspective to historical geography' and re-evaluating such concepts, previously banished from scientific research, as 'historical accidents' or 'memory'. Now it becomes possible to 'chart the particular path which is chosen, with reason why it is the case ... and to ask whether bundles of alternative paths can be grouped together in such a way that they constitute a *type* of city' (Wilson 1983a).

But, from a theoretical point of view, these models do not identify any economic forces beyond the spatial interaction, the profit maximizing mechanism and the traditional, demand-oriented, urban multiplier effect to explain the structure and dynamic path of the urban hierarchy.

What is even more disappointing is that all recent approaches to urban development do not consider *economic innovation,* the truly dynamic element that, after Schumpeter, may be seen as the 'primum mobile' and the driving force in capitalist societies (Camagni 1984). Innovation does not only determine relative regional development, mainly in its form of technological progress in industry, but it also shapes relative urban growth, mainly through the creation of new producer or consumer services, the increasing sophistication of existing services, the improvement of tertiary functions within industry and their selective decentralization along the urban hierarchy (Andersson and Johansson 1984; Camagni and Cappellin 1984).

The present paper was written to address this widespread dissatisfaction with respect to the present state of the art of urban analysis. It builds upon some basic ideas developed in a previous study (Camagni et al. 1984) and presents a supply-oriented dynamic model that theoretically integrates three fundamental elements: innovation, urban hierarchy and spatial interaction. On the basis of this model, a computer simulation of the dynamics of an abstract urban system was run, in order to test the structural behaviour of the model and to ascertain the theoretical conditions for the emergence of an urban hierarchy.

9.2 The 'Efficient' Size of Urban Centers

The starting point of this work resides in the old standing question about the economic limits to urban growth. In fact, the idea of the existence of an 'optimal' city size, though fascinating, is contradicted by logical objections which limit its theoretical relevance and explain its poor empirical validation (Richardson 1972; Marelli 1981).

This last statement is confirmed by the fact that in the real world urban decline is taking place not just in large primate urban centers, but also in medium size cities and even in small towns. Indeed, in the last decade the urban system of Northern

Italy's Po plain has shown negative population growth rates not just for primary centers (7 out of 9), but also for secondary centers of 75,000–150,000 inhabitants (8 out of 19) and also for small centers of 20,000–75,000 inhabitants (27 out of 113) (Camagni et al. 1984).

This phenomenon is neither explained by recent approaches to urban growth, nor by the city life-cycle model (Klaassen et al. 1981; Van den Berg and Klaassen 1981). But a new fruitful and more relevant hypothesis may be put forward: namely, the hypothesis that an *'efficient' city-size interval exists separated for each hierarchical city rank, associated with its specific economic functions*. In other words, for each economic function, characterized by a specific demand threshold and a minimum production size, a maximum city size also exists beyond which the urban location diseconomies overcome production benefits.

Let us assume that, for each *localized* economic function *(F)* or bundle of goods associated with a specific rank in the urban hierarchy, there exists:

 (i) a minimum efficient production size (A_0, A_1... .in Fig. 9.1) and a supply or average cost curve that becomes perfectly horizontal above that size (*TAC*), as is currently assumed by most industrial economists;
 (ii) a traditional (Löeschian) demand curve (*D*) that is negatively shaped owing to the existence of spatial friction, for each income and population density level in the center and its surroundings; and consequently;
 (iii) a family of demand curves (*D'*,*D''*,...) as the demographic dimension of the single center increases (Fig. 9.1). These curves define the equilibrium market production for each size of the center (A_0', A_0'', A_0''', ...), and the equilibrium average cost and revenue.

It is then possible for all functions (F_0, F_1, ...) ranging from the lower to the upper, to define a curve of average production benefit (*APB*), associated with the dimension of the *urban center* and defined by the 'mark-up' over equilibrium direct costs (*DAC*) (Fig. 9.2). In this respect the city supplies both a spatially protected market that is not subject to distance decay, and broad availability and accessibility to qualified production factors.

Average profits may be assumed to increase as urban functions become of a higher order, due to (a) growing entry barriers, (b) decreasing elasticity of demand which allows extra profits to be gained in all market conditions far from the long-run equilibrium, and (c) increasing possibility of obtaining monopolistic revenues due to the use of scarce, qualified factors.

Moreover, we can directly compare this curve of average *production* benefits for each function with an Alonso type curve of average *location* costs (*ALC*), including land rent and congestion costs associated with urban size (Alonso 1971) (Fig. 9.2). Therefore, *for each economic function and each associated urban rank, it is*
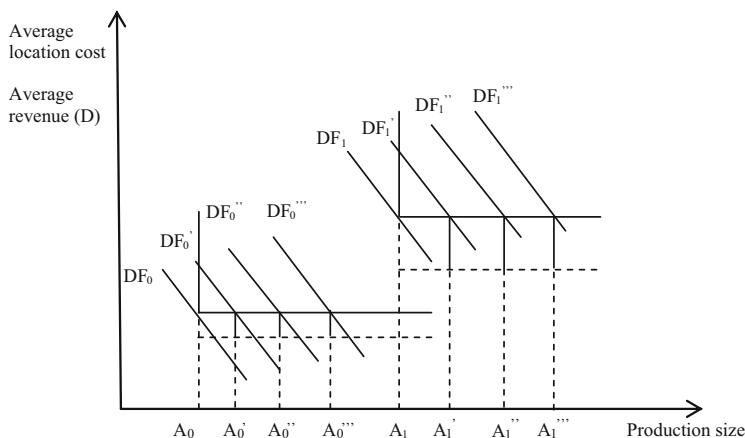
Fig. 9.1 Demand and cost curves for different functions (F)
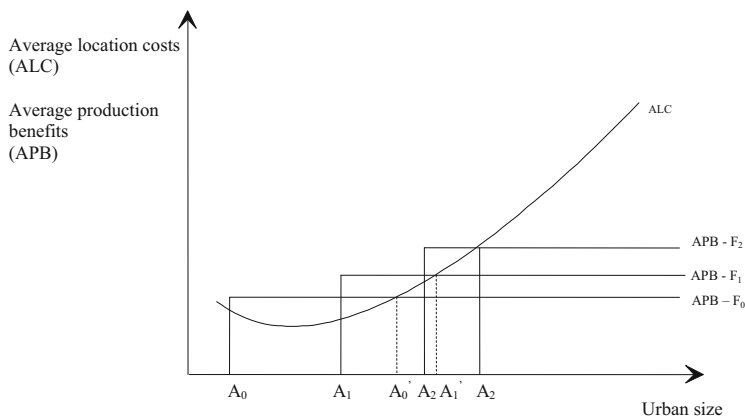
Fig. 9.2 Efficient urban size for different urban functions

possible to define a minimum and a maximum efficient city size, which would increase with the level if the urban function and rank (A_0–A_0' for the function and the centre of rank 0, . . .).[1]

As each center grows, it becomes potentially more suitable for the location of higher order functions, in terms of elements of both demand and supply. Lower

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[1]All curves presented in Figs. 9.1, 9.2 and 9.3 are 'average' and not 'marginal' curves as they refer to demand and supply conditions of the entire competitive *market* and not of a specific *firm*. In Fig. 9.1, the spatial market of functions 1, 2, ... is illustrated; in Figs. 9.2 and 9.3, on the other hand, a sort of aggregated urban land market is presented, with a supply curve which includes rent and congestion costs, and demand curves coming from the different urban functions.

order functions may be assumed to persist within higher order centers due to an intersectoral redistribution of the surplus attained by higher order functions.

In a dynamic setting, many elements may change the static picture presented hereto. Both growing per capita income which widens the market (holding population density constant) and fluctuations in income elasticity of demand and in relative physical productivity or terms-of-trade among the different functions may modify the efficiency interval for each city rank. These last two elements are particularly important from a theoretical point of view: in fact, they were shown to be directly linked to the k rate in Beckmann's model of urban hierarchy and to be the economic determinants of the shape of the urban rank-size distribution (Beckmann 1957; Beguin 1983).

Another dynamic element is technical progress and in particular the application of microelectronics in industry, as it reduces minimum optimal production size in each sector or function. It may therefore generate, on the one hand, the spatial diffusion of higher order functions towards lower order centers (from A_1 to A_0 in Fig. 9.3); on the other hand, it may create in larger centers a condition of oversize with reference to the maximum efficient urban size interval for their respective production (from A'_1 to A''_1).

9.3   Urban Dynamics

Within each single interval, each center should grow according to its distance from an 'equilibrium' size where production benefits equal location costs; its path follows a logistic curve, which theoretically fits neatly into Wilson's 'unified' model of location and growth (Wilson 1983a).

Population increase in this case may take place mainly through migration, from other centers and from outside the urban system considered.
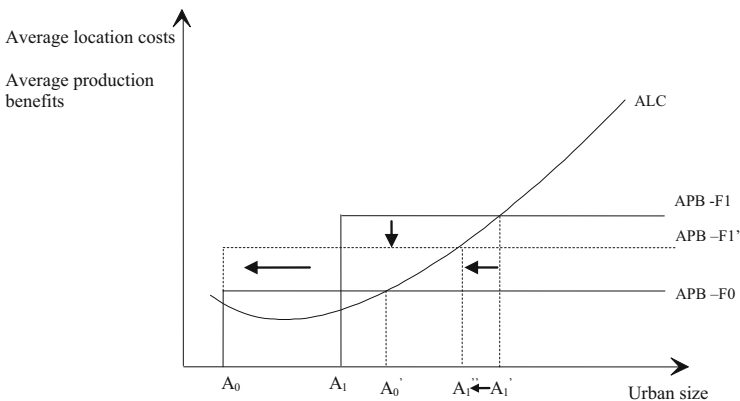

Fig. 9.3 Technical progress and efficient urban size

This spatial interdependence describes that form of the dynamic behaviour of a city system which has been called *'constrained dynamics'*. This form 'refers to a system where the element of time plays an intrinsically important role in the evolution of state and/or control variables without, however, affecting the structure of the system itself' (Nijkamp and Schubert 1983).

But another, more relevant, dynamic behaviour may be considered when 'the system configuration exhibits an incremental or integral change'. This behaviour is termed *'structural dynamics'*. In this case, innovation and bifurcation play the dominant conceptual role.

In our urban setting, each center's long-term growth possibilities are tied to its *ability to move to ever higher urban ranks, developing or attracting new and superior functions*. This ability is by no means mechanically attained, and does not spring directly from a simple market dimension, as in most traditional demand-side, export-base models.

Urban size, which is, however, a proxy not only for market size but also for presence of qualified production factors, is nothing but a necessary precondition for acquiring a new function. The real acquisition of a new function (n), once the size of the center has overcome its appearance threshold (A_n), depends upon the innovativeness of the private and public urban sectors and may be treated as a stochastic variable within the model.

As in Allen's model of urban dynamics (Allen 1982), each center's growth path is subject to successive bifurcations which are linked to the appearance (within the correct intervals) of new economic functions as well as to the pace of general technical progress. The latter is responsible for sudden reductions in maximum efficient city size and for consequent urban decline in terms of population. Leaving aside the general spatial interaction among centers, the single center path may be described as in Fig. 9.4.

The probability of each center's entering a new phase of development by capturing a new function depends on many endogenous elements:

(a) the ability to overcome the minimum appearance threshold, which controls for the existence of appropriate production factors and of a minimum 'sheltered' local market;
(b) the possibility of a spillover or diffusion process from centers of a higher rank, located in close proximity;
(c) the diversification of local production, in terms of the presence of the entire range of activities or functions that characterize the single urban level (Chinitz 1961); indeed, a specialized oligopolistic urban structure is likely to be less innovative than a competitive, diversified one;
(d) the general situation of spatial competition with respect to the single new function. In fact, the existence of a sufficient market share for each center when it acquires a higher function is a condition for its persistence in the higher rank of centers. Through this competitive mechanism, demand is introduced into our supply-oriented model; nevertheless, differently from
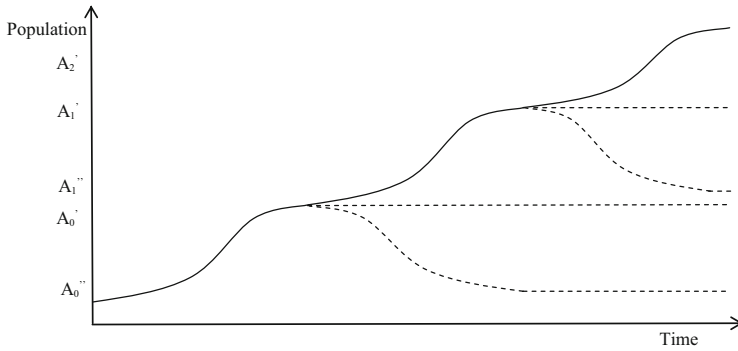
Fig. 9.4 The development path of the single center

most of the existing models, it is conceived as a minimum threshold, not as the driving force in the dynamics of the urban system.

9.4   The Model

The basic mechanisms of urban evolution may be expressed by two equations describing population growth at the single center j and the stochastic process of changing in rank.

Let $K = (k_1, ..., k_j, ... k_n)$ represent the state vector of the rank of each center at time t. Then the differential equation of population growth in each center j of rank k within the interval of 'efficient' city size, a process we have labelled as 'constrained dynamics', may be defined as follows:

$$\dot{P}_j = P_j \left\{ [B_{k_j} - C(P_j)] \left[a + m \sum_{i \neq j} P_i f(c_{i,j}) \right] - m \sum_{i \neq j} P_i [B_{k_i} - C(P_i)] f(c_{ji}) \right\},$$

(9.1)

where P is population, a is the net migration rate from outside the urban system + the net natural growth rate, c is cost associated with distance, m is the inter-urban migration rate within the system, k denotes the urban rank and the associated economic function, C's are the average location costs, an increasing function of urban size, and B_k' s are the average production benefits for function k in center j, as defined in Fig. 9.2.

Moreover,

$$B_{k_j} = \bar{B}_{k_j} \quad \forall P > A_k, \quad \text{and}$$

$$f(c_{i,j}) = \exp\left(-q_{k_j} c_{i,j}\right),$$

where q_k is an attraction or accessibility coefficient and A_k is the minimum appearance threshold for each function.

The equation describes essentially a logistic growth of population up to some limiting values which depend on the specific values of B_{k_j} and therefore on the rank of center j.

A second equation defines the 'structural' dynamics of the urban hierarchy, which come into play when each center captures new, higher functions and consequently moves to higher ranks in the urban hierarchy.

In this respect, the process of urban growth and decline may be described through a stochastic process where the single center j of rank k constitutes the system. The state vector defines the probability of belonging to the rank k. The transition probability matrix is markovian and non-homogeneous, since the probabilities, defined as functions of population size in j, change with time.

If Π_k is the probability of belonging to rank k, its change in time may be defined as the sum of the probabilities of entry and exit, due to the gain or loss of functions k, $k-1$ and $k+1$,

$$\dot{\Pi}_k = \Pi_{k-1} \cdot GR_{k-1} + \Pi_{k+1} \cdot DC_{k+1} - \Pi k (GR_k + DC_k) \qquad (9.2)$$

GR_k is defined as the rate of change of the rank k of the city to the rank $(k+1)$ and expresses the ability of capturing new higher level functions.

The probability GR_k can be considered as the product of the following events:

– the overcoming of the appearance threshold A_{k+1} (in population terms) of the next higher level rank of economic activities;
– the existence of externalities or spillover effects coming from centers of higher order (EX); and
– the differentiation vs. specialization of local economic structure, representing a favourable condition for innovation and local creativeness; this element is expressed in terms of a Theil index of sectoral specialization (SP).

$$GR_k = g\left\{\exp\left[(P_j - A_{k+1})/A_{k+1}\right]\right\} \cdot hEX_k \cdot lSP_k$$

where

$$EX_k = \sum_{k_i > k_j + 1} \sum_{i \neq j} P_i f(c_{ji})$$

and

$$SP_k = \left[-\sum_n S_{jn} \ln S_{jn} \right]^{-1}$$

S_{jn} is the economic dimension of the n sub-functions or sectors in center j, and h and l are normalizing factors. In its turn, DC_k is the rate of change from rank k of the city to rank $(k-1)$. This probability of losing function k (and to leave the corresponding urban rank k) depends on the overcoming of a demand constraint, given by the average market potential Φ of all centers which compete in the same function k,

$$DC_k = r \cdot \left[\prod_{i \in i:(k_i \geq k_j)} \Phi_i^{wi(j)} \right] / \Phi_j,$$

where

$$\Phi_j = \sum_i P_i f(c_{i,j})$$

and

$$w_{i(j)} = P_i / \sum_{i \in i:(k_i \geq k_j)} P_i.$$

9.5   The Dynamic Simulation

The temporal evolution of the stochastic process presented above has been studied through a random sampling simulation model based on a Monte Carlo procedure. This procedure is applied to the process of gain and loss of functions along the urban hierarchy; by this, the random character of the model and the importance attached to the innovation process are highly emphasized.

The simulation model allows us not only to analyse and compare the behaviour of the system under different parameter values, but also to evaluate the impact of different initial conditions upon the final asymptotic state of the system.

Particularly interesting initial conditions may be found (1) in some homogeneous spatial configuration describing an abstract early stage of urban development, and (2) in some theoretical equilibrium state of the hierarchical system, such as a 45° negatively sloped Zipf curve or a Christaller type spatial pattern of centers distribution.

To provide the basis for numerical experiments, an idealized geometrical zoning system is employed, in which the centers are arranged on a regular (triangular, quadratic or hexagonal) grid and where the distance among them is a parameter of the simulation (see appendix for details on the simulation procedures and parameters employed).

With respect to other similar dynamic simulation models, which are mainly concerned with sensitivity analysis and with the stability analysis of the asymptotic

behaviour of the system, the major emphasis in our case is devoted to the simulation of different abstract processes bearing a precise theoretical interest.

The theoretical problems which the model has actually been used to deal with are the following:

(1) the effect of technical progress, represented by continuous shift in the appearance thresholds of urban functions, on the spatial and size distribution of centers;
(2) the effect of different forms of the net benefits function (B–C: production benefits less location costs), and in particular the effect of different hypotheses concerning the average net returns to urban scale; in our specific case, we are referring to constant, decreasing and increasing returns to urban rank, as net benefits are steadily diminishing within each interval of 'efficient urban size' and only an innovation or a jump over a higher rank may increase them;
(3) the effect of different spatial deterrence parameters, with reference to both the general internal accessibility of the system and the relative spatial friction for different economic functions.

Two initial states of the system were chosen: an abstract state of uniform city rank distribution (with all, small-sized, centers randomly lying within the size interval of the second rank), and an equally random Zipf-type distribution of centers, ranging from the lowest ($<12,500$ inhabitants) to the highest ($>800,000$) of seven city ranks.

Starting from a set of parameter values taken from the real world experience of the Lombardy urban system, viz. birth, deaths and migration rates, general and relative spatial friction parameters, simulations were run in these alternative cases:

– high general spatial impedence, not presented here in detail, vs. a rapidly smoothing-down impedence with rising urban functions;
– constant, linearly increasing and exponentially increasing net returns to urban rank;
– fixed vs. variable appearance thresholds of the different functions, in order to simulate absence or presence of technical progress.

Nine cases are presented and discussed here in detail.

Case 1A. Homogeneous initial distribution and absence of technical progress; constant returns to urban scale.

Case 1B. The same conditions as before, but linearly increasing returns.

Case 1C. The same conditions as before, but exponentially increasing returns.

Case 2A. Zipf-type initial distribution and absence of technical progress; constant returns to urban scale.

Case 2B. The same conditions as before, but linearly increasing returns.

Case 2C. The same conditions as before, but exponentially increasing returns.

Case 3A. Zipf-type initial distribution and diminishing appearance thresholds (50% in the first 50 years); constant returns to scale.

Case 3B. The same conditions as before, but linearly increasing returns.

Case 3C. The same conditions as before but exponentially increasing returns.

9.6   Main Results

The main results of the simulation may be summarized as follows.

(1) the simulation model shows a strong internal consistency, due to the high interdependence of its parts (Eq. 9.1), and a strong stability in time. Indeed 200 years were necessary to create the entire urban hierarchy in the case of homogeneous initial distribution (Fig. 9.5);

(2) higher probabilities of decline are found at the periphery of the system, where it is difficult to overcome the minimum demand threshold;

(3) a general condition for the creation of an urban hierarchy seems to reside in the presence of increasing returns to urban scale (or rank). In fact, starting from a homogeneous initial condition, a very flat hierarchy organized over only four ranks was apparent after 200 runs in the constant returns hypothesis (Tables 9.1 and 9.2); moreover, in the Zipf-type initial distribution of centers, the hierarchical structure is hardly maintained under constant returns (case 2A), as it is shown by the flattening of the slope of the Zipf curve (from 1.075 at t = 0 to 1.028 at t = 100), the diminishing importance of the prime center (from 20% to

Fig. 9.5 Final spatial structure of centers (rank 5, 6, 7) when the initial state of the system is homogeneous
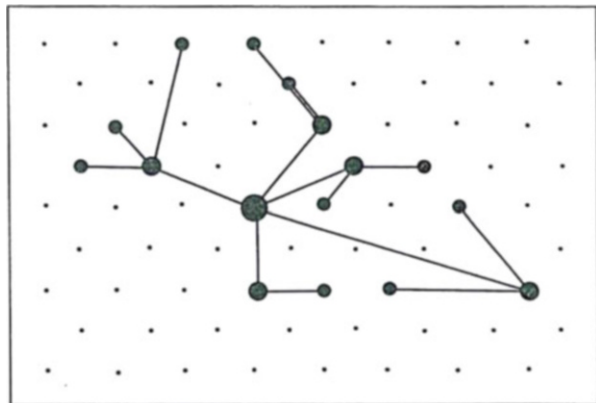
Table 9.1 Rank-size distribution of centers in the final state

Cases	Year	Total population	(a) Intercept	(b) Slope	R^2
1A	200	6,976,000	2.46	−0.348	0.750
1B	200	11,388,000	3.34	−0.926	0.930
lC	200	17,942,000	3.57	−0.954	0.918
Initial	0	6,282,000	3.18	−1.075	0.985
2A	100	7,126,000	3.19	−1.028	0.989
2B	100	7,736,000	3.27	−1.081	0.986
2C	100	18,043,000	3.80	−1.189	0.937
3A	100	6,888,000	3.22	−1.054	0.987
3B	100	7,432,000	3.31	−1.101	0.978
3C	100	15,769,000	3.71	−1.138	0.851

ln $Pop = log\ a - b$ ln (rank k)

Table 9.2 Frequency of centers in each rank of the urban hierarchy

Cases	Year	Rank 1	2	3	4	5	6	7
1A	200	5	13	42	12	0	0	0
1B	200	15	21	9	17	7	3	0
1C	200	10	18	12	16	10	5	1
Initial	0	26	21	14	5	3	2	1
2A	100	38	13	10	6	4	0	1
2B	100	37	14	9	7	3	1	1
2C	100	13	20	14	10	6	6	3
3A	100	10	27	13	12	6	3	1
3B	100	10	27	13	9	7	4	2
3C	100	8	5	19	16	6	12	6

18% of total population) and the general shift towards lower order centers. This is in our view one of the most interesting results of the simulation model, as it adds to Christaller's key concepts of 'demand threshold' and 'range' a further economic condition for hierarchization of centers, along theoretical lines similar to those recently highlighted by Beguin (1983);

(4) the absence of a high generalized spatial impedence was proved to be another, expected, condition for the creation of an urban hierarchy. In fact the simulations run under homogeneous spatial deterrence functions for the different rank-dependent bundles, omitted here, showed a marked difficulty of the higher centers to stabilize and even reach a sufficient market and population size;

(5) in the Zipf-type initial distribution of centers, the hypothesis of linearly increasing returns with urban rank (case 2B) allows the persistence of the urban hierarchy in its initial shape and spatial pattern (Fig. 9.6): a sort of steady-state in which population increases due to natural growth and migration from outside the system, leaving the relative size of centers almost untouched;

Fig. 9.6 The spatial structure of the urban hierarchy (rank 5, 6, 7) in case 2B, i.e., Zipf-type initial distribution, no Technical progress, and linearly increasing returns to urban scale
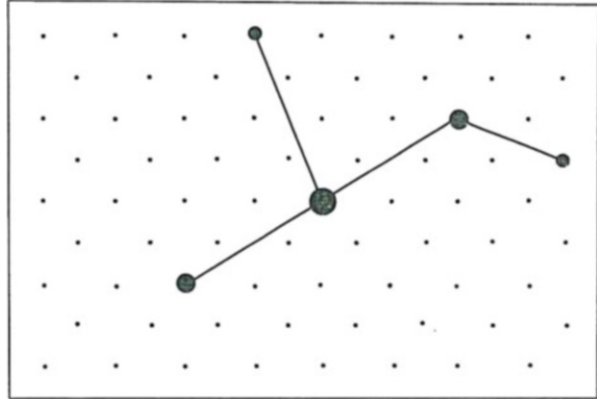
(6) the hypothesis of exponentially increasing returns, which strongly favours the innovative centers of the highest ranks, creates a steeper distribution of centers and a wider number of top cities (3 vs. 1 in the 2C case: see Tables 9.1 and 9.2). These cities are not necessarily the 'historical' ones: an innovative center with a favourable position in the entire system may overcome initially higher ranked cities in this case (Fig. 9.7);

(7) the previous tendency towards a policentric urban structure is strongly emphasized in case technical progress was taken into account: six centers are found in the sixth and seventh rank in the 3B case (against two in the 2B case) and 18 in the 3C case (against nine in the 2C case) (see Fig. 9.8). In fact, due to the shifting down of appearance thresholds of the different functions, higher functions may be easily captured by smaller centers and the 'prime' urban role almost disappears: the biggest city accounts for only 11 and 5% of total population in the 3B and 3C case respectively. Only in the constant returns case (3A) a traditional hierarchy persists, though at lower population levels, as the shifting down of the appearance thresholds goes in parallel with the shifting down of the entire urban system, as seen before.

9.7   Conclusions

In this paper a dynamic simulation model of urban growth and decline is presented, where innovation at the urban scale is crucial. The model is deeply characterized in terms of supply conditions of the different functions or bundles of goods produced at the different ranks of the urban hierarchy. Urban dynamics depends on the form

Fig. 9.7 The spatial
structure of the urban
hierarchy (rank 5, 6, 7) in case
2C, i.e., Zipf-type initial
distribution, no technical
progress, and exponentially
increasing returns to urban
scale
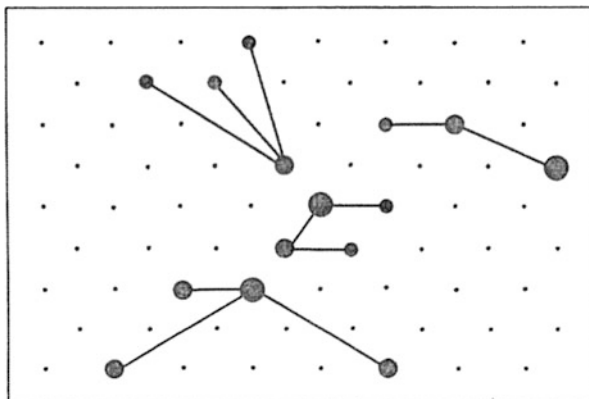
Fig. 9.8 The spatial
structure of the urban
hierarchy (rank 5, 6, 7) in case
3C, i.e., Zipf-type initial
distribution, no technical
progress, and exponentially
increasing returns to urban
scale
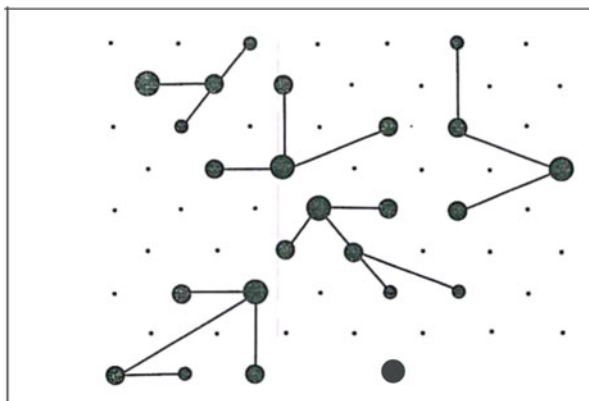
of the net location benefits curve, in relation to urban size and rank, and it is
constrained by demand or market size conditions.

Both urban growth and decline are linked to two kinds of elements: the presence
of positive location benefits in the actual production activities, and the appearance
of innovations or new production, which generate bifurcations in the historical path
of the single centers.

Different spatial configurations of the urban hierarchy are the outcome of
different hypotheses concerning the initial state of the system, the presence of
technical progress and the presence of increasing net returns to urban scale. The
latter condition is proved to be crucial for the formation of an urban hierarchy.

Appendix: Parameter Values of the Simulation Model

Number of centers: 72.
Number of ranks: 7.

Distance among centers: 20.

Minimum appearance thresholds for the different functions:

12.5 25 50 100 200 400 800 (thousands of inhabitants of the center).

Maximum efficient city size:

30 60 120 240 480 880 1600 (thousands of inhabitants of the center).

Frequency of centers in each rank in the initial state:

– homogeneous case: 0 1.00 0 0 0 0 0,
– Zipf-type case: 0.39 0.25 0.18 0.11 0.04 0.02 0.01.

$\Delta t = 1$ year.

b = birth rate = 0.003.

d = death + outmigration rate = 0.003.

a = intra-system migration rate = 0.08.

q = decay function coefficient for migration movements = 1/60.

Transportation cost coefficients for each function:

1/20 1/40 1/80 1/160 1/320 1/640 1/1280.

g = growth probability coefficient = 0.03.

r = decline probability coefficient = 0.03.

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From City Hierarchy to City Network: Reflections About an Emerging Paradigm

10

Roberto Camagni

10.1 Introduction

According to textbooks of theoretical geography and urban economics, the analytical model which still better describes in strictly economic and locational terms the structure of the city system is Christaller's and Losch's central-place model developed in the 1930s and 1940s. After the basic refinements introduced by Isard, Beckmann and McPherson, a huge literature has grown upon the same logical foundations and simplifying assumptions with the works of Parr, Beguin, Mulligan and others, but it has not changed the basic economic characteristics of the initial model: it still remains the more elegant, abstract but consistent representation of the hierarchy of urban centres.[1]

Nevertheless, real city-systems in advanced countries have deeply departed from the abstract Christallerian pattern of a nested hierarchy of centres and markets. The reduction in transport costs and the demand for 'variety' of the consumer have broken the theoretical hypothesis of separated, gravity-type, non-overlapping market areas; 'location economics' *à la* Hoover and synergy elements operating through horizontal and vertical linkages among firms have generated the emergence of specialised centres, in contrast with the typical despecialization pattern deriving from the theoretical model; high-order functions locate sometimes in small (but

[1] For a recent presentation of the entire corpus of literature on central-place models, see Mulligan (1984) and Beguin (1988).

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specialised) centres where the model's expectations refer only to lower-order functions.

This evidence is not at all new, and the deficiencies of the model are often highlighted; but to change the underlying assumptions would mean to change the model itself, and no other set of clearly defined hypotheses have ever replaced the former ones.

On the other hand, another evidence contrasts with the logic of the model. Urban policies are increasingly addressed towards economic goals: to enhancing the efficiency of the local production fabric, attracting new sectors and functions, widening the markets of the local firms through better external transport and communication linkages. According to the logic of the model, this kind of goals lacks any economic rationale: location of sectors and roles of the single centres are defined on the sole basis of the requirements of scale economics and the advantages of city size. Once again, the hypothesis of the emergence of a new logic in the spatial behaviour of economic activities beyond the gravity one, and of the relevance of new economic elements beyond scale economics and transport costs, looks increasingly necessary and fruitful.

In the search for this new logic, some most recent theoretical reflections on firm behaviour may be used, and analogies with the approaches used in other disciplines or branches of economic theory explored. In particular the concept of 'firms networks', utilized in the theory of the firm to encompass all those new organizational and contractual forms that imply 'cooperation' among firms (strategic alliances, technological and commercial cooperation, joint-ventures, consortia, and so on), looks crucial in two respects: first because it provides us a new 'paradigm' to understand the economic and spatial consequences of those firm behaviours which are intermediate between competition and internal development, between 'market' and 'hierarchy' in the terminology of the institutional and transaction-cost approach to the firm (Williamson 1985); second, because it opens the possibility of developing the analogy of 'city networks', a concept that is already widely used in spatial planning and urban geography in countries like France and Italy, but which deserves a deeper theoretical underpinning.[2]

The aim of this paper is twofold:

– first, to analyse in theoretical terms the recent evolution of the city system, which has deeply departed from the abstract Christallerian pattern of a nested hierarchy of centres and markets, and to propose a new theoretical paradigm to understand its nature and evolution: the network paradigm;
– second, to analyse how the aforementioned change affects the tasks and nature of city planning, introducing the necessity on an intentional city strategy

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[2]For the use of the 'network' paradigm in organization theory see: Boissevain and Mitchell (1973) and Johannisson (1987); for its use in the theory of firm behaviour, especially in an innovation context, see: Freeman (1990), Kamann and Nijkamp (1990), Kamann and Strijker (1991), Camagni (1989a, 1991).

concerning the functions performed by the city, its role in the spatial division of labour, its competitiveness and linkages with respect to the other nodes of the city network.

The nature of the emerging paradigm will be inspected first, at the firm level, both in general economic terms and in terms of spatial behaviour (Sects. 2 and 3); then, through the well-known logical link between the shape of the firm's market areas and the structure of the city-system, the evolution of the latter will be analysed in depth (Sects. 4 and 5); finally, in Sects. 6 and 7, the consequences of all this will be inspected as far as the nature and goals of city planning are concerned, both at the level of the single city and of the regional city-system as a whole.

10.2   Cooperation Networks: The Emerging Paradigm in Economic Behaviour

In recent years, a new interesting behavioural paradigm has emerged in the real world of firms' conduct, intermediate between the traditional ones of market resort and internal development: this new paradigm, cooperative in nature, has been identified in 'firms networks', and presents itself in the form of cooperation agreements and strategic alliances (OECD 1986; Foresti 1986; Camagni and Gambarotto 1988; Camagni 1989b; GREMI 1990).

Cooperation—technological, commercial, financial—appears as a new economic archetype in the era of continuing innovation and fast technological change, in the presence of 'market failure' when dynamic and innovative behaviours are concerned (the market does not deliver the right and punctual signals in this case) and of the high costs of a growth strategy based on the sole internal know-how (Camagni 1989a).

The objectives of the new behavioural model may be summarized in the following:

– to reach sufficient scale economies, through the merging of R&D facilities, production or marketing structures;
– to control the market of complementary assets, necessary for assuring fast reaction capability; and
– to control the development trajectories of crucial complementary assets, in order to assure continuous innovation capability.

The advantages of the new behavioural form are found in the avoidance of high transaction costs which are inescapable when crucial inputs are requested through the market, and in the reduction of the high costs implied by the strategy of internal development of a new technology or competence.

The new cooperation strategy is typical of firms operating in high-tech sectors, but also more traditional sectors are increasingly adopting the same strategy, in their search for rejuvenation and restructuring processes. This strategy implies a

Table 10.1 The three logics of spatial organization

Levels and aspects	Organisational logics		
	Territorial	Competitive	Network
Firm:			
Nature	Local market firm	Export firm	Network firm
Crucial function	Production	Marketing	Innovation
Strategy	Control of market areas	Control of market shares	Control of innovation assets and their trajectories
Internal structure	Single unit	Specialized functional units	Functionally integrated units
Entry barriers	Spatial friction	Competitiveness	Contiguing innovation
City system:			
Principles	Domination	Competitiveness	Cooperation
Structure	Nested Christallerian hierarchy	Specialisation	City networks
Sectors	Agriculture, government, traditional tertiary activities	Industry: industrial districts and filières of specialisation	Advanced tertiary activities
Efficiency	Scale economies	Vertical/horizontal integration	Network externalities
Policy strategy	None: size determines functions	Traditionally: none, as export-base determines growth; Nowadays: strengthening of competitive advantage of each centre	Intercity cooperation: Intercity physical network provision
Intercity cooperation goals	None (except military or diplomatic goals)	Intercity division of labour	Economic, technological and infrastructure collaboration
Networks of cities	Hierarchical, vertical networks	'Complementary networks'	'Synergy networks' 'Innovation networks'
Single City:			
Nature	Traditional city	Fordist city	Information city
Form	Relatively internal homogeneity	Monofunctional zoning	Multifunctional zoning, policentric city
Policy goals	Power and image	Internal efficiency (clockwork city)	External effectiveness and attractiveness
Symbols	Palace, cathedral, market	Chimneys, skyscrapers	Airport, trade fair

different attitude with respect to spatial relationships: in fact, it calls not just for the simple control of product markets or inputs markets, but also for direct linkages with other innovative '*milieux*', where a specific know-how or technology is developed, or with firms which were previously either competitors or simple providers of production inputs.

10.3 The Three Logics of the Spatial and Market Behaviour of the Firm

From a theoretical and abstract point of view, it is possible to identify three logics of spatial behaviour of the firm: we may call them the territorial, the competitive and the networking logic (Table 10.1).

According to the first logic, the territorial one, a firm sells (and buys) from the geographical space it gravitationally controls. Space is therefore organized into the well-known Löschian honeycomb of market areas, where the friction of space, embodied in the transport cost, at the same time differentiates the products of the competing firms and represents the strongest entry barrier into the market.

The crucial function of the firm is production and its strategy consists in the control of the market area defined around its geographical location.

According to the second logic, the competitive one, the market of a firm is not restricted to the local territory, as transport costs do not play a relevant part; the firm may sell anywhere, trying to control the widest *share* of the global market. Competitiveness, differently achieved and interpreted by the different firms, becomes the crucial element in the economic arena, and marketing the crucial function of the firm; the market of each production unit is limited by both its relative economic strength and by the 'variety' demand of consumers. 'Two way' trade, or the geographical interchange of the same products in two directions, becomes the role, as, for example, Turin people are no more obliged to buy only Fiat cars.

In its search for effectiveness and economics of scale, the firm is more and more organized into specialized units, performing only one of the functions of the production cycle: manufacturing, R&D, marketing, general management. This specialization pattern, which takes advantage of both scale economies and location economies (as each functional unit may be localized in the most appropriate spot, given the characteristics of its production inputs) replaces the integrated organizational model of the previous case.

Space and spatial dis-homogeneities are no more a simple constraint to the output market, but are directly exploited by the firm in a global optimization process which takes into consideration, beyond the accessibility to geographical markets, the accessibility to labour, skills and other production inputs. The location of the firm is therefore determined by geographical and historical specificities, and no more by a single logic, as it happens in simplified general equilibrium models. With respect to these latter, location becomes completely random. Only in the case where a production input may be realistically assumed as perfectly immobile

(though scattered in geographical space) and the accessibility to it as costly, a regular pattern of locations may be re-built on the basis of spatial *input* markets (Parr 1989).

According to the third logic, the network logic, innovation becomes the crucial function of the firm and the control of innovation assets and their time trajectories its main goal. The firm, wherever located, may overcome the weakness in crucial know-how of its internal structure and of the surrounding '*milieu*' by linking-up with other firms and by establishing cooperation agreements.

These transterritorial linkages apparently annihilate the spatial or geographical dimension; but in fact they do not. On the contrary:

– they emphasize the need for a presence of the firm in the information and communication nodes of the worldwide technological, commercial and financial networks; and
– they point out the crucial need for the firm to present itself as an efficient partner, this attribute being reached either through a strong internal culture or through its location in a 'district', highly rich in Marshallian 'industrial atmosphere' (Camagni and Pompili 1990; Camagni 1991, Introduction).

The geography of locations shows, as a consequence of the new organizational logic, a centripetal bias, originated both by the demand for accessibility to the nodes of the international information network and by the search for new synergies within the firm. In this second respect, the pattern of dispersed, monofunctional and specialized units is replaced by a pattern of functional reintegration in centrally located 'mission units', where the maximum of innovativeness may be achieved through the physical proximity of engineering, production, marketing and research functions (Camagni 1988).

How is it possible to pass from the locational logic of the single firm to the general spatial allocation of activities and functions? It is well-known that in what we called the 'territorial logic', agglomeration economies may explain the coexistence of lower order functions in centres where higher order functions are already located, and that gravity-type considerations may attract the different firms towards the centre of the territorial market areas, where demand density is higher.

In the 'competitive' logic on the contrary, agglomeration may derive rather from supply than demand considerations: the agglomeration of firms belonging to the same sectors ('district economies') or the same industrial complex (control of components suppliers, '*filières*' of local specialization) allows to reach higher levels of static and dynamic efficiency, giving rise to specialized industrial areas and '*innovative milieux*' (Aydalot 1986), made up of vertically or horizontally integrated firms (the long standing concept of 'localization economies').

The third logic is more complicated. In spatial terms it implies the presence of:

– nodes of localised and specialised know-how (in 'poles', 'districts', 'parks', 'valleys', 'corridors', ….) interlinked through cooperation agreements and financial/technological/marketing alliances; or

– multi-functional nodes belonging at the same time to different economic and spatial networks. In this respect the old concept of 'urbanization economies' is revitalized here in terms of interaction and synergy of network functions: the city gains a role as an interchange node among a set of worldwide networks of physical and information interactions.

If scale economies and generic agglomeration economies are the main efficiency elements that shape the spatial structure of location centres under the first logic, economies of vertical and horizontal integration are the main efficiency elements in the second logic, and 'network externalities' in the third one. In this last respect, the network operates as a 'club good' delivering advantages only to the members of the club, an intermediate structure between 'private' and 'public' goods.

The three logics of spatial organization presented here are of course to be considered as the theoretical archetypes, and not directly as historical behavioural patterns. In some respect, they have never coexisted, as they apply specifically to different sectoral specificities (respectively to the primary, secondary and tertiary or information sectors). Nevertheless, as these sectors or functions have prevailed in different and successive periods in recent history, the three logics may be assumed, very carefully though, as the leading paradigms of different 'accumulation régimes'.

10.4   The Structure and Evolution of the City System

What consequences may derive from the aforementioned logics of spatial organization on the structure and shape of the city-system?

The territorial logic is the basic theoretical underpinning of the Christallerian hierarchy of centres.[3] This logic applies well, even if in abstract and simplified terms, to the spatial behaviour of the following activities:

– agricultural production and markets (except for 'industrialized' agriculture producing mass 'commodities' and 'specialised' agriculture producing diversified products, like special wines, etc.);
– public administration and movement functions;
– private and public service activities; in particular, the "traditional" ones (retail and wholesale trade, health and education, . . .) but also the modern ones (private consultants, banking and insurance, advertising,. . .) and in general the activities where the customer bears the transport cost.

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[3]As far as the micro-economic foundations of the central-place model and the spatial structure of each sector are concerned, the natural reference is mainly to Lösch; when on the contrary we refer to the general organization of centres and to the spatial structure of *all* sectors and market areas, we mainly follow Christaller. In fact, in Lösch's general spatial equilibrium model the crucial notion of urban 'hierarchy' is lost.

Therefore, the Christaller model applies well to those societies where these sectors account for the overwhelming share of economic activities. On the other hand, the model presents many drawbacks, which limit widely its empirical relevance in modem societies. In fact:

(i) it overemphasizes the role of transport costs, a fact that reduces its usefulness for the interpretation of industrial location and markets;
(ii) it neglects input-output relationships, and in particular horizontal linkages among specialised firms and, in spatial terms, horizontal linkages among specialised centres of similar size, performing different but complementary functions (in the model, only vertical, hierarchical linkages among centres of different size and rank are considered);
(iii) it neglects 'network externalities', or the 'synergetic surplus' that may come to the partners (firms or cities) of a cooperation network. These externalities may be utilized to explore the concept of 'city networks', as will be explained below.

These limitations in the theoretical assumptions of the model are relevant, and in fact empirical observations provide conflicting evidence with respect to its outcomes. In particular, we may observe:

(I) processes of city specialization, especially in industry but also in services, which contrast with the prediction of Christaller's model about the hierarchical de-specialization of each centre (Cappellin and Grillenzoni 1983);
(II) incomplete presence of the whole range of functions in each city (all the bundles of goods and services of equal or inferior rank) (Emanuel 1988; Emanuel and Dematteis 1990);
(III) presence of high order functions in centres of lower order (Dematteis 1985);
(IV) horizontal linkages between similar functions (and cities): e.g., the financial network among top cities in the worldwide hierarchy.

Under these circumstances, our hypothesis is that a new paradigm of spatial organization should be considered, the *network paradigm*, which links with the new logics of spatial behaviour we have labelled as the 'competitive' and the cooperative, 'network' logic.

As far as the 'competitive' logic is concerned, it creates the well-known phenomenon of industrial districts, specialised by sectors or by '*filière*', and, as a result, a host of territorial relationships among centres based on privileged complementarity relations in both production and marketing. These relationships occur mainly at the intraregional level, as is the case, for example, of the specialized centres of the car industry *filière* or of the textiles industry *filière* in the Third Italy regions, with a spatial division of labour among headquarter, manufacturing, design, and equipment-producing centres.

The third logic, the 'network' one, in its turn determines a set of privileged synergetic relationships among centres that cooperate or interact in the same fields

or functions, through information, communication or transport networks. Analogous to a previous statement concerning network relationships among firms, a city-network may be considered as a 'club good', providing externalities to the partners which cooperate on the basis of horizontal linkages and perform the same functions. Also in this case, networks might be seen as a way of generating (urban) scale economies in a cooperative way, without implying a growth of the single centres, and of distributing the consequent advantage among the partners.

Therefore, in the organization of the city-system two kinds of city-networks appear:

(A) *complementarity networks*, made up of specialized and complementary centres, interlinked through a set of input-output and market relationship; the interurban division of labour guarantees at the same time the existence of a sufficiently wide market area for each centre and the achievement of scale and agglomeration economies. Good examples of these networks are provided by the specialised cities in Randstad Holland or in the Veneto area in Italy;

(B) *synergy networks*, made up of similar, cooperating centres. In this case the necessary economies of scale are provided by the network itself, which integrates the market of each single centre. Examples of this networks are the already mentioned financial cities, whose markets are virtually integrated through advanced telecommunication infrastructures, or tourist cities connected through cultural or historical 'itineraries'.

A third category, or better a sub-category of the second one, might also be found, namely:

(C) *innovation networks*, made up of centres cooperating on *specific* projects in order to reach a sufficient critical mass, both with respect to demand or to supply considerations. Examples of these networks are the recent cooperation agreements among French cities in the fields of infrastructure provision (airports, ...), technological services, etc.

It might be important to note that these three types of city networks refer respectively to the three main goals (and categories) of the new network behaviour of firms which we have mentioned in Sect. 7.2.

The preceding reflections may be synthesized in the following definition: *city-networks (réseaux de villes) are systems of relationships and flows, of a mainly horizontal and non-hierarchical nature, among complementary or similar centres, providing externalities or economies respectively of specialization/complementarity spatial division of labour and of synergy/cooperation/innovation.*

This is mainly a deductive 'conjecture', in search of a proper theorization and empirical validation. Many aspects still require further indepth reflection; namely the economic rationale, the economic effectiveness and the law of motion of the new organizational logic and the way in which the new hypothesized network linkages may be observed and measured (Camagni 1990).

In this last respect, Dematteis' geographical school in Italy has attempted, for almost a decade, to reveal empirically the network linkages among the centres of the lower ranks in the Po valley (from province head-cities downwards). The linkages inspected refer to our first category—complementarity linkages among specialized centres—but the results are not yet conclusive, in my opinion. After having measured in a proper way the shifts between actual and theoretical sectorial mix in each centre, the existence of direct complementarity relationships is mainly inferred deductively in the case of couples of neighbouring centres of similar size presenting respectively a very high and a very low employment share in some sectors (Emanuel 1988; Emanuel and Dematteis 1990).

The main difficulty in this field is that the nature of the problem requires 'flow indicators' among the centres, while at this detailed territorial level mainly 'stock indicators' exist. The author was engaged in a huge research project using telecommunication flows data, whose early results look encouraging. The existence of network relationships among centres was deducted from the divergence of the real flows with respect to the abstract structure simulated by a spatial interaction model (Camagni et al. 1994).

10.5 Towards a New Theorization

In spite of actual weaknesses in the empirical inspection, the theoretical research programme appears challenging and worthwhile. Some theoretical elements are already at hand, and on that basis the following statements may be proposed regarding the organization of the city system. These statements are addressed to the problem of the (in)-compatibility versus complementarity of the two paradigms, the hierarchical and the network paradigm, and to the analysis of the economic elements that might have allowed the latter pattern of territorial organization to outperform and substitute the preceding, historical pattern:

(a) economic space is organized according to an eclectic logic, and no longer according to a single principle. Different logics superimpose to each other on the territory, both because of a time succession and because they refer to different aspects or to different kinds of activities, giving rise to a complex pattern of overlapping spatial structures;

(b) the traditional Christallerian hierarchical principle remains visible as:

b′. the regulatory paradigm of agricultural, administrative/bureaucratic and tertiary activities, whose main territorial logic is still linked to the definition of non-overlapping market areas; and as:

b″. the 'memory' or the historical heritage from the times when the aforementioned sectors were the ruling ones, revealed by the persistence of agglomerations and centres long after having lost their historical role.

Remembering that agriculture, public administration and tertiary activities together represent much more than half of total employment or value-added, it

     is evident that the traditional model is far from becoming obsolete and useless, as it is argued sometimes;

(c) market areas for production inputs *à la* Parr, and in particular for labour inputs of various skills, contribute to the shaping of the city system, with regards to the search, by economic activities, of:

    c′. specialized labour, this case giving rise to a non-hierarchical structure of 'district areas' of sectorial specialization (the specialised districts of the 'Third Italy');

    c″. qualified labour, giving rise to a hierarchical structure of labour-market areas, a structure which is the most similar to the traditional Christallerian one; and

    c‴. just-in-time inputs and components procurement (Toyota city, Turin metropolitan area).

(d) The comparative advantage of local production, and, through it, of the single centres, is secured through:

    d′. internal economies of scale, as in the traditional model;

    d″. internal economies of scale, as in the traditional model;

    d‴. vertical integration between firms, '*en filière*' (the silk *filière* in Como is an excellent case, going from manufacturing to machine tool production, design, CAD, commercialization and worldwide image creation; but also the already mentioned car production *filières* organized on limited territories, going from R&D in mechanical engineering to design, marketing and manufacturing, are good examples of the same phenomenon) (Camagni and Diappi 1989);

(e) cooperative relationships among production units may establish network externalities for:

    e′. specialised and complementary centres, managing in a natural or a planned way the inter-urban division of labour (the aforementioned case of Randstad Holland, with the division of labour between Amsterdam, Rotterdam and The Hague);

    e″. top-ranking centres, acting as nodes in the information and communication network linking headquarter functions, financial activities, high-level tertiary activities with a multinational internal organization like consulting or advertising (the case of "world cities");

    e‴. centres of any order, specialized in the same sectors or functions, tightly interlinked among each other in order to capture the scale effects of being 'locked in' a network (we have here the cases of specialized financial centres like the Swiss ones; the centres specialised in advanced R&D; the tourist cities organised into 'itineraries', etc.).

    From the point of view of the explanation of the empirical phenomena that contradict the traditional city-system model, points d′ and d″ may be utilised to understand specialization processes and the incomplete presence of the whole range of functions in a centre (points I and II above), while point d‴ may explain why a centre of a limited size may acquire an international standing, concentrating the whole range of its functions along a specialization filière.

A city system of a Christallerian nature emerges from the processes underlined in points b, c″ and c‴. On the other hand, a specialization pattern of city centres and a 'complementarity network' of centres à la Dematteis derives from statements c′, d′, d″, d‴, e′; a "synergy network" of centres derives from statements e″ and e‴.

According to most recent reflections (Dematteis 1988a, b; Camagni 1990), the traditional urban hierarchy simplifies and collapses into a hierarchy of city-networks, organised in three main levels (see Fig. 10.1):

– *the network of world cities*, performing the whole range of functions ('complete cities', in the terminology of Conti and Spriano 1989), competing and cooperating along high-performing information and communication networks;
– *the network of specialised, national cities*, interlinked through input-output and trade linkages; and
– *the network of specialised, regional cities*, interlinked through the same kind of linkages.

Within each type of network, the linkages are of course horizontal. Among the different types of networks, the linkages are:

– upward market linkages (as cities belonging to a lower order network may sell specialised products to cities of the higher order network);
– downward, hierarchical market linkages (of the traditional Löschian market areas type);
– downward, hierarchical input-market linkages (*à la* Parr).

The cities of the second and third network level are part of specialization or 'complementarity' networks. The cities of the first network level are contemporaneously the nodes of different types of high-level 'synergy' networks: telecommunication and transport, physical networks; business and headquarter information networks; personal networks of top managers and VIPs; financial networks; cultural networks.

10.6   Policy Strategies at the Level of the City System

The evolutions that we tried to depict and to inspect hitherto have a profound impact on the nature, the goals and the general philosophy of territorial planning.

In fact, and remaining here at the level of the city system, from what we have called the simple 'territorial' logic, no real case for a policy intervention or strategy emerges: the pure logic of city size prevails, and size determines function at each level of the hierarchy. Each city is inescapably linked to its rank, and to the consequent functions, income and power (Table 10.1).

Also in the case of specialized cities, working within what we have called the 'competitive' logic, traditionally no policy strategy could be proposed, as city

First level
network
(World cities):
information
linkages

Second level
network
(specialized
national cities):
input-output,
market and
cooperation
linkages

Third level
network
(specialised
regional cities):
input-output
and trade
linkages

Synergy network
and first level,
information
networks

Complementarity
networks (input-
output and trade
relationships)

Market areas
(for output,
input of
labour and
components

Fig. 10.1 The hierarchy of city-networks

growth was only dependent on the growth of its export base. More recent reflections (during the sixties) on the role of 'residential' or service activities in securing the competitiveness of the urban export base and in providing chances for new industrial specializations have opened the way to possible interventions, directed towards the creation of an 'urban atmosphere' and an advanced urban culture. Furthermore, the reflections of the early 1980s on the role of the urban environment and urban quality of life in the attraction of both advanced functions and highly educated classes have led to the launching of new economic strategies for urban areas.

But in the case of the third logic, the network and cooperative one, a strong rationale emerges for economic policy intervention at the city and city-system level.

The theoretical framework presented above leads to the definition of new policy strategies, based on the concept of city-networks. In fact, the ideas of:

– a planned intercity division of labour;
– the strengthening of the competitive advantage of individual cities through *filière* integration of functions and possible complementarities with neighbour centres;
– the provision ·of intercity advanced physical networks in order to enlarge cooperation and synergy among cities of the same level, derive directly from the new illustrated model of economic behaviour.

The existence of complementarity networks of specialised centres opens up the possibility for the single centre to upgrade the reach of its market and of its image, through the development of the high-order functions that may secure its internationalization. These functions could not be developed on the sole basis of the demand of the local market; but, if a specific specialization is pushed ahead in terms of production quality, quantity and territorial (agreed) monopoly, and if the advanced function itself is devoted specifically to the treatment of the specialization sector, all the economic preconditions for its appearance and flourishing are secured. Examples of this are the location of advanced public activities like specialized fairs, technical research units and universities in centres that would have never been able to support these activities on the sole basis of the size of their core and their hinterland (Como and the silk *filière*, Brescia and the mechanical engineering *filière*, etc.).

On the other band, the role of a top city on a first level city-network and the advantages it can extract from it, widely depend on the competitiveness of the city itself. Therefore, for the strategic planning activity the possibility is opened of:

– developing priority functions, in which the city has some comparative advantage (and this brings us closer to the case of specialised cities); and/or
– developing all the possible synergies among selected functions (e.g.: top management—transport—tourism—culture; fashion creation—fairs—tourism—art exhibitions;...).

Among first-level European cities, Paris is the one that is apparently following this strategy with the most clear intention and willingness.

The necessity, and on the other hand, the new opportunities opened to a strategic planning process at the city-system level, are strengthened by three considerations, which are very clear to certain national and regional government agencies in Europe nowadays:

– the consciousness that the main effects of the completion of the European Single Market will be on the large metropolitan and urban centres. The liberalization of capital flows; the establishment of a unified market for banking, financial and insurance services; the forecast establishment of commercial subsidiaries of big non-European multinational companies in the core markets of each country; the effects of the internationalization of the single economies; all these processes will strengthen the position of metropolitan areas within the general European city-system, but will also put the burden of international competition on the shoulders of these same areas, which will compete directly with each other (GREMI 1989). An example of this concern was the request of French Prime Minister Rocard to former Director of Datar, Mr. Carrez, to explore the conditions for "*affirmer la vocation de Paris à être la première des capitales européennes tant en matière économique qu'en matière scientifique et culturelle*" (October 1989);

– the probable effect of the disclosure of eastern European countries, which will shift eastward the economic and political barycentre in Europe; especially in France, this problem is felt with increasing preoccupation;

– the evidence that the European city hierarchy in terms of internationalised functions is much flatter than the hierarchy defined in terms of all economic functions (Reclus-Datar 1989); this fact opens the chance for cities belonging to our second-level network to acquire an international status (and connected wealth) in spite of their limited population size;

– the idea of the necessity for each city to elaborate a growth strategy on the basis of its perceived comparative advantage, and for the central authority to sustain in terms of financial resources these strategies, has been recently adopted by public authorities in France and Italy. In France, Datar is pushing cities to elaborate their own economic and development strategy, and is ready to sign the so called '*contrats de ville*' (city contracts), substituting the previous mechanism based on '*contrats de plan*' defined on a regional basis. In Italy, the same attitude is assumed in most recent planning documents of the Veneto Regional Government, while the Lombardy Regional Government is now considering a document prepared by its Scientific Committee for Economic and Territorial Planning advocating the strengthening of the network structure of the city system and an orientation of the spatial division of labour between cities ('*Politiche economiche e ambientali per la Lombardia del 2000*', June 1990);

– at the same time, the idea of a close cooperation between cities ('*réseaux de villes*') has been followed since some years in France; strategic planning documents based on a network philosophy are now under elaboration for the cities of La Rochelle-Poitiers - Angouleme, Montpellier-Nimes, some cities in Bretagne and other regions. Once again, the theme seems to be the cooperation in physical networks provision, the definition of a functional division of labour, the strengthening of complementarities and specificities ('*vocations*').

10.7   Policy Strategies at the City Level

The new spatial logic of economic organization has opened new degrees of freedom to planning functions and generated the conviction that the city needs, beyond the traditional planning documents controlling land use (the British Master Plan, the French *Plan d' occupation des sols*, the Italian *Piano Regolatore*, the German FNP – *Flächen-nützungsplan*), a strategic document emphasizing the perspective role of the city, the possible global scenarios, the goals and instruments of the planning process, the actors and the partners, the implementation phases and the assessment criteria. In this respect, the French tradition of the *Schéma Directeur* represents since the sixties an important anticipatory experience, mainly emphasizing the strategies in physical planning.

The new intervention philosophy based on non-compulsory, indicative and strategic planning has provided two extra-benefits to the general planning process. First, to avoid the traditional and paralysing opposition between 'rational—comprehensive plans', trying to control in a detailed and inflexible way all aspects of urban structure and growth, and the "deregulation" attitude (visible in the version of the British Inner City Policy and Enterprise Zones Policy followed by the conservative government in the eighties). Secondly, to allow the inclusion, in the general planning documents, of elements of political or social 'utopia' (as an example, the commitment of the Milano city government to devote 50% of derelict industrial land to parks and social services) (Table 10.1).

Different empirical experiences exist of the new attitude towards strategic planning documents in Europe (Gibelli 1990a):

(A) an experience of "strategic planning" proper, coming from a direct analogy with respect to the private companies' planning process. This tradition comes from some U. S. experiences in the early eighties, such as the Strategic Plan for the city of San Francisco, prepared by Arthur Andersen (1980), and mainly reflects the objective of an effective planning process. Economic goals for the city are inspected, implementation phases are defined, instruments and actors are activated, criteria for economic impact analysis and assessment of the outcomes are proposed. In Europe, similar experiences may be found in two strategic plans in Spain, Barcelona and Bilbao (*Plan Estratégico de Barcelona*, 1989; *Plan Estrategico para la Revitalizacion del Bilbao Metropolitano*, 1990, prepared by Arthur Andersen and in the Strategic Plan of Madrid, now underway (1992);

(B) strategic documents which align economic aspects with social and environmental issues, on the lines drawn by the Strategic Management Research Centre of Minnesota University. Belonging to this second tradition are the four documents preliminary to the revision of the SDAU of Ile de France (1989–90), the STEPL—*Stadtentwicklungsprogramm* in Munich (1983), the plans for the Lyon metropolitan area (Lyon 2010, 1988, prepared by a consortium of municipalities, SEPAL), for Strasbourg (Strasbourg Ville International, 1988) and for other cities like Montpellier and Nancy;

(C) strategic documents to insert important infrastructure interventions into a sound framework of economic and policy scenarios. Belonging to this class are two relevant planning documents of the Milan municipality: the *Documento Direttore Passante Ferroviario* (1984), referring to the construction of a major underground railway line, and the *Documento Direttore sulle Aree Industriali Dismesse* (1989–90), on the rehabilitation of industrial derelict areas;

(D) strategic documents mainly elaborated by the central government to assist the revitalization policy towards distressed urban areas: the British Inner City Policy documents of the eighties, mainly or totally drawn by the Department of the Environment;

(E) strategic environmental plans, starting from air quality control issues to launch major comprehensive economic and physical planning strategies, along the lines of the recent planning interventions in the Los Angeles metropolitan Area (Los Angeles 2000–1989; Air Quality Management Plan—1989; see Gibelli 1990b). Along these lines, many debates exist in Europe (especially in the big Italian cities), but no real and formalized experience (Fig. 10.2).

The main economic, locational and planning issues in these documents may be found in the following:

– attraction of valuable and crucial functions in the city;
– internal re-equilibrium of the location of these functions, in the direction of the realization of a 'polycentric' city, each centre encompassing multiple and integrated functions (residential, headquarter, recreational and commercial, technological);
– urban quality, in terms of parks and public services;
– avoid traffic congestion;
– proper and 'strategic' reutilization of highly symbolic buildings and derelict areas.

Conservative planning attitudes have contrasted the new 'modernist' philosophy, especially in countries like Italy. In fact, some risks do exist in the new approach, which have to be carefully inspected and counterbalanced:

– the risk of creation of a 'two speed' city, if mainly advanced and crucial functions are considered;
– the risk that these very general strategies, especially when elaborated outside the public administration, may represent only the vehicle for the approval of speculative projects;
– the risk of a disequilibrated relationship between the private and the public partner, in favour of the former, in the conception of the plan.

Fig. 10.2 Urban planning
philosophies Source: Gibelli
(1988)
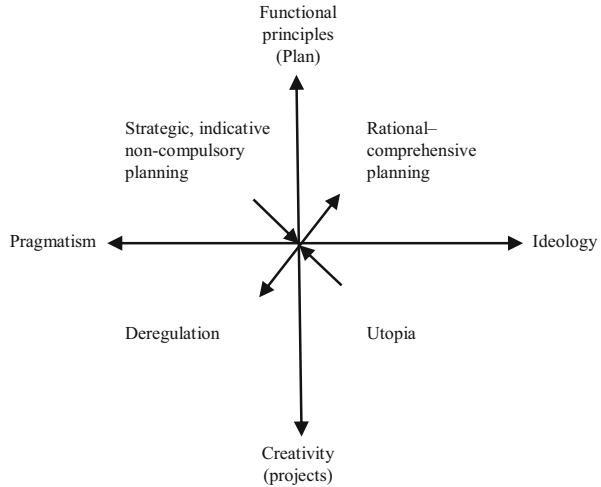
10.8 Conclusions

In this paper, it is shown how the logics that shape the city system are more
complicated than the simple 'territorial' and hierarchical logic of the traditional
central-place model. The control of the market of outputs, inputs and innovative
assets is performed by the firm not only in terms of management of a gravity area,
but also and increasingly in terms of network relationships.

The new behavioural logic of the firm parallels and partly determines the new
organizational logic of the city system, where phenomena of specialization and
networking also appear.

This new pattern of territorial relationships opens up new degrees of freedom for
the planning activity, as a city is confronted with wide possibilities and alternatives
as far as its development path is concerned. The case opens up therefore for
intentional city strategies, both at the level of the single centre and at the level of
the entire city-system.

This opportunity was recently grasped by a new attitude in city planning,
concerning the presentation of strategic planning documents in many European
cities and regions; these experiences have been briefly examined.

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Urban Milieux: From Theory to Empirical Findings

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11

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Roberto Camagni and Roberta Capello

11.1 Introduction

The aim of this paper is to present a theoretical reflection on the relationships between the concept of Innovative Milieu (I.M.) and that of the city interpreted in economic and spatial terms, and to provide empirical evidence on the existence of urban milieux.

The concept of the innovative milieu has been extensively developed during the eighties among regional scholars[1]: it interprets phenomena of spatial development as the effect of innovative processes and synergies which occur over limited territories. The Innovative Milieu is comprised of a set of relations which unite a local production system, a set of actors and representations and an industrial culture; together, these generate a localized dynamic process of collective learning. Space, assumed as mere geographic distance, is replaced by territory (or relational space), defined through economic and social interaction; time, usually understood as mere sequence of intervals on which to measure quantitative variations of smooth variables, is conceived here as the pace of learning and innovation/creation processes (Camagni 1995). The *milieu innovateur* functions like a microcosm in

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[1]On the "milieu innovateur" theory see, among others, Aydalot (1986), Aydalot and Keeble (1988), Camagni (1991), Maillat and Perrin (1992), Maillat et al. (1993), Ratti et al. (1997), Camagni (1999) and Crevoisier and Camagni (2000). The concept has recently been inserted into textbooks on Regional Economics (Capello 2004), witnessing the scientific strength of the theory. Lambooy participated actively in the first rounds of the GREMI analyses. See Lambooy (1986).

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which all those elements which are traditionally considered as the genetic sources of development and economic change operate as if they were *in vitro*, highlighted and enhanced by spatial proximity and by those economic and cultural homogeneities which allow the *milieu* itself to exist. Smithian processes of division of labour among units belonging to the same productive cycle; processes of learning-by-doing and learning-by-using *à la* Arrow, amplified beyond each enterprise by the high mobility of the specialized labour force inside the local area; Marshallian or Allyn Young-type externalities, generated by a common industrial culture and intense input-output interactions; the formation of Schumpeterian entrepreneurship, facilitated by specific historical competences, sectoral specialization and ample possibilities of imitation; cross-fertilization processes *à la* Freeman, which generate systems of integrated and incremental innovations—all these are essential components of the *milieu innovateur*.

At a first glance, the concept of the milieu innovateur as defined above does not seem to share many characteristics with the city: the only similarity, in theoretical terms, resides in the agglomeration and proximity element.[2] But if one proceeds to a more accurate consideration, and in particular if one abstracts from the consideration of the physical element which is more easily attached to the common image of the "city", presenting it as a built environment, more similarities will emerge. In fact, taking up a theoretical perspective in terms of *relational capital, spatial interaction and learning processes*, one could easily find that the genetic elements of the City and the Milieu are not so distant: they are in fact at least commensurable, comparable, though bearing a different level of complexity.

Under the generic conceptual umbrella of the agglomeration principle, which we consider as a common genetic principle of both phenomena, lies a wide spectrum of different elements/processes/effects, which span from the development of a common identity and sense of belonging to the "socialized" production of human capital and know-how; these elements and processes—which are not deterministically, but only probabilistically linked to the pure agglomeration fact—once empirically established prove to be at the heart of both the innovative nature of the Milieu and the "progressive" role of the City.

Our thesis is that:

(a) under certain conditions, the comparison of the two concepts, I.M. and City, is legitimate;

(b) the two concepts, or theoretical archetypes, share many characteristics; the City is a more complex form of Milieu, as it intrinsically encompasses economic differentiation (vs. the natural specialisation of the Milieu) and the entire sphere of residential and life activities of population (which are only considered by the Milieu concept when they generate synergy and learning effects directly useful for the innovation process);

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[2]Lambooy has largely provided contributions to the debate on agglomeration economies. Among his works on the subject, see Lambooy (1997).

(c) from a conceptual perspective, the relationships between City and Milieu can take place in two distinct forms:
  – Urban Innovative Milieux: I.M. located in cities and exploiting the urban atmosphere;
  – City as Innovative Milieu: the entire city behaving as a Milieu.

The aims of the papers are twofold:

– to develop a conceptual comparison of the two concepts, in order to underline common features and mutual theoretical relationships (Sect. 11.2);
– to provide quantitative empirical evidence on the existence of "urban milieux". The empirical evidence is based on a database of firms located in five European cities, namely London, Paris, Amsterdam, Stuttgart and Milan (Sects. 11.3 and 11.4).

11.2 Cities as Milieux

11.2.1 The Conditions for a Comparison

A word of caution and prudence is necessary from the very beginning when dealing with such a multifacets realm as the city. In fact:

(a) the city is a complex phenomenon, probably the most complex product of mankind. It is "un territoire particulier,. . ., le dispositif topographique et social qui donne leur meilleure efficacité à la rencontre et à l'échange entre les hommes" (Roncayolo 1990). Therefore it can be analyzed under different perspectives: "comme structure materielle, comme système d'organisation sociale, comme ensemble d'attitudes et d'idées, comme costellation de personnes s'impliquant dans des formes types de comportement collectif" (Wirth 1938);
(b) cities have evolved in history, performing different functions, and even nowa-days they are undergoing fast structural changes. In particular, the form of the city is rapidly evolving, and its boundaries with respect to the non-city are blurring (Remy and Voye 1992): forms of low density peri-urbanization, processes of "metropolisation", edge-city developments on one side; evolution of the countryside in terms of infrastructure, social equipment, life-styles on the other (Camagni and Gibelli 1996);
(c) there exist different kinds of cities: of different size (therefore performing different functions within the spatial division of labour), different specializa-tion, different location (ports, ...);
(d) cities are differently linked together within wider regional spaces (urban systems, hierarchies, city-networks) and therefore their role and functions cannot be fully interpreted through the consideration of the isolated, standalone city;

(e) cities are indicated by great historians (Braudel, Pirenne) and sociologists (Weber, Sombart) as the birthplace of innovation (economic, political, cultural); but other functions are characteristically performed by the city, giving rise to an economic advantage: defence (once), control and power, cultural interchange.

As a consequence of the theoretical complexity and the empirical diversity of the object of this reflection, the limits and the characteristics of the approach have to be made clear:

(i) we limit ourselves in a first approximation to economic aspects: the city as a particular and efficient form of organisation of economic relationships (though by the term "economic relationship" we mean a much wider set of factors and interactions than the mainstream economic textbooks do). The interpretation we are going to give of the city's role and performance is therefore partial, though not trivial;

(ii) the main dimensions under which the city is analysed are:
   – a relational one (the city as a set of territorial and social relationships),
   – a dynamic one: the city as a learning system;

(iii) we assume, at least initially, an abstract and archetypal approach to the city (the City with a capital c), abstracting from geographical or historical differentiation, theorizing the characteristics of the urban environment which:
   – have an impact on economic phenomena and economic performance, and
   – explain the genesis of the city as an efficient form of organization of economic relationships. As already said, these economic functions are not the sole functions performed efficiently by the city, but are nevertheless (very) important;
   – explain its innovative character, a character that historians and economists usually assign to it.

(iv) we do not consider different, non-economic aspects, which have strong feedback effects on the economic performance of the city: city size, form, environmental quality ...

11.2.2 The Economic Role of the City and a Taxonomy of Urban Agglomeration Advantages

An economist looks at the city as a self-organising system (Camagni 1996), whose competitive advantage resides in (i) agglomeration (the city as a "place"), (ii) accessibility (the city as a "node" in global networks), (iii) interaction (the city as "relational capital"), addressed to the achievement of collective goals such as economic efficiency, welfare (at least for ruling classes), territorial power and control.

In history, the success of this form of social organisation was striking, and it allowed the achievement of further general goals like cultural development, quality

of life, individual freedom, and more generally democracy, and progress, modernisation of the society, innovation in the economy.

In a sense, we can affirm that the I.M. generates a short-circuit between the general characteristics it shares with the City (agglomeration, accessibility, interaction) and the specific outcome, namely innovation, reducing the complexity of the full process of urban development and its high degree of roudaboutness, and forgetting about the other possible outcomes.

It is important to note that the characteristics of innovativeness that in the abstract scheme is directly attributed to the City or the I.M. may well be absent in many (or most) empirical circumstances. In fact the existence of a City or of a Milieu is only a relevant precondition for innovativeness, but its actual manifestation depends on finer local specificities and, on the aggregate is subject to stochastic processes.

Starting with the agglomeration element which characterises the urban environment, and which in some respects may encompass also the other two elements— external accessibility and networking goes hand in hand with urban size, and the same happens to internal interaction potential, a direct function of size and differentiation of urban activities—we can device a taxonomy of the single sub-elements on which agglomeration advantages reside.

On the one hand, a distinction can be made, in a quite traditional way, between "hard" and "soft" elements of agglomeration advantage, and, on the other hand, less traditionally, between the two main sources of the same advantage, namely *indivisibilities,* stemming from city size, and *synergy,* allowed by more subjective elements like interaction, cooperation, synergetic processes (Fig. 11.1).

In the lower left side of the table, we find the advantages which derive from the provision and concentration of public goods such as infrastructure and overhead capital, public services, large urban functions like fairs, congress facilities, universities, and the cultural heritage. On the other hand, in the lower right side we find advantages connected with the nature of big market of the city:

– market for products, market for human capital, market for private services on the demand side;
– market for a diversified supply of intermediate inputs, on the supply side.

On the upper right side of the picture we can find the elements which are more interesting in my view, which were pointed out in the recent past: elements connected with the synergetic action performed by the city. In fact we find (Camagni 1991, 1995):

– accessibility to information—which is inherently a cooperative good—through informal, face-to-face and inter-personal contacts;
– explicit cooperation among actors, stemming from trust, common sense of belonging to a community sharing the same values;
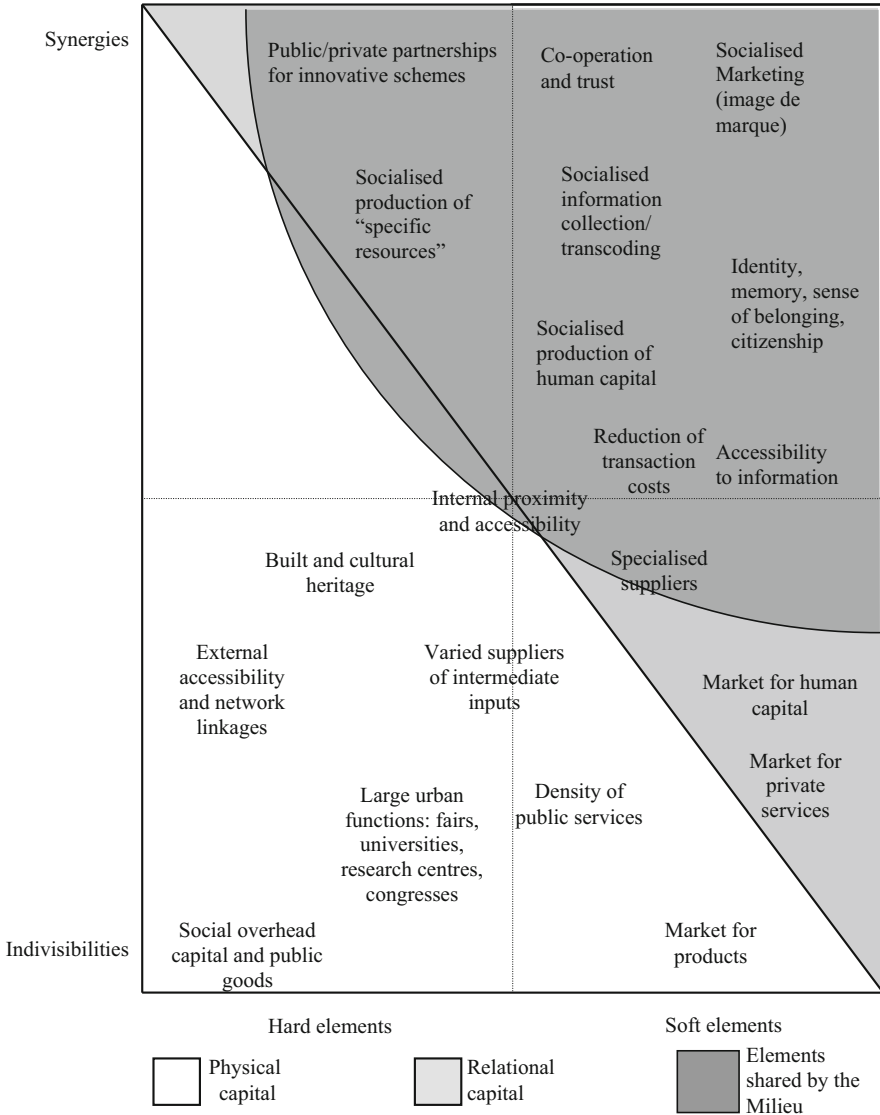
Fig. 11.1 Sources of urban agglomeration advantages. Source: Camagni (1999)

– implicit cooperation among actors, in the form of socialized production of:
– skilled labour;
– human capital for high-level managerial functions;
– marketing (*"image de marque"*);
– information transcoding.

Some of these functions may be embodied in the provision of physical or "hard" elements like dedicated infrastructure or important urban projects realized through private/public partnership. Therefore we find in the upper left part of the graph the socialized provision of "specific resources", to the use of typically urban productions or functions.

The lower triangle of the table encompasses what could be labelled as the "functional capital" of the city, of a mainly physical nature; the upper right triangle on the other hand may be seen as representing the "relational capital" of the city.

In our opinion, it is on the theorisation of the relevance of the relational capital of territorial systems that the contribution of this kind of reflection brought the most advanced results. And in fact the Innovative Milieu shares with the city many of the abovementioned characteristics, stemming from proximity (the grey area in Fig. 11.1), and may lend many theoretical and analytical tools to the interpretation of the city. In fact, territorial relational capital resides in different elements:

(a) the synergy and cooperation element, embedded in the local "milieu effect" and in territorial cooperation networks (Aydalot 1986; Maillat and Perrin 1992; Maillat et al. 1993). These elements were subsequently theorized by the French proximity school[3] and by Storper with the concept of "untraded interdependencies" (Storper 1995);
(b) the socialized nature of the production of specific resources, as skilled labour and human capital, or the socialized production of market signals (Gordon 1989; Camagni 1991);
(c) the reduction of dynamic uncertainty, inherent in processes of technological innovation and economic transformation, through:
   – socialised management/transcoding of information;
   – ex-ante coordination and control over competitors' actions (Camagni 1991).

One important element that differentiates the I.M. from the City resides in the relevance of size, which is crucial in the urban environment, as it was shown earlier through the indivisibility element. The nature of the City being a big market for products and for production factors, and particularly for labour, was stressed by Veltz (1993) as representing an important locational advantage of the City over the I.M., another way of achieving the reduction of uncertainty (*"ville-assurance tout risque"*).

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[3]See, among others, Bellet et al. (1993), Dupuy and Gilly (1995), Rallet (1993), Rallet and Torre (1995) and Gilly and Torre (2000).

11.2.3 The Theoretical Relationships Between the Milieu and the City

From arguments developed so far, the theoretical similarity between the City and the Milieu emerges with relative clarity. They share the elements of proximity, strong internal integration, synergy, and psychological and cultural identity. Furthermore, they share the functions of collective and socialized production of specific resources, human capital and market signalling and of supplying the substrate for collective learning processes.

Their special characteristics may be described as follows:

Cities	Milieux
mostly de-specialized	mostly specialized
important physical agglomeration	important proximity, even without agglomeration
general-purpose infrastructures	oriented infrastructures
private services with intersectoral market	private services integrated in filières
social heterogeneity	social homogeneity
identity defines productive "vocation"	productive "vocation" defines identity

As said before, the City is a much more complex system, addressed towards major social goals which are not relevant for the Milieu; and they bear a physical dimension (built environment, size, built and cultural heritage) which is alien to the Milieu.

Another logical path that can be traced in the case of both concepts regards how to pass from the functional aspects of the territory to the innovative milieu aspects.

In the same way as the Milieu represents the relational capital of local territorial systems, adding the elements of synergy, governance and identity, so the City as Milieu represents the relational capital of the Urban Context (Fig. 11.2). The innovative element of both the Milieu and the City derives from the existence of collective learning processes and the development of a common "vision" for the evolution of the local milieu.

But in the case of the City, another relevant situation may emerge (represented by the central column in Fig. 11.2): the presence of an Urban Milieu, a network of informal or selected linkages developed around a specialisation sector or filière, developing inside the Urban Context or the Urban Production System. Empirical evidence suggests that many cases exist of such Milieux or Innovative Milieux which characteristically exploit an urban atmosphere (and therefore an urban location), without implying that the entire city behaves like a Milieu. The cases of the financial milieu in cities like Zurich, Geneva, Frankfurt; the innovative milieux developing around the fashion creation filière in Milan or Paris; the media or the communication milieux in Hamburg and Milan are important examples.

Still adopting a dynamic approach and the aim of interpreting innovation processes, existing literature attributes to the City some characteristics that may
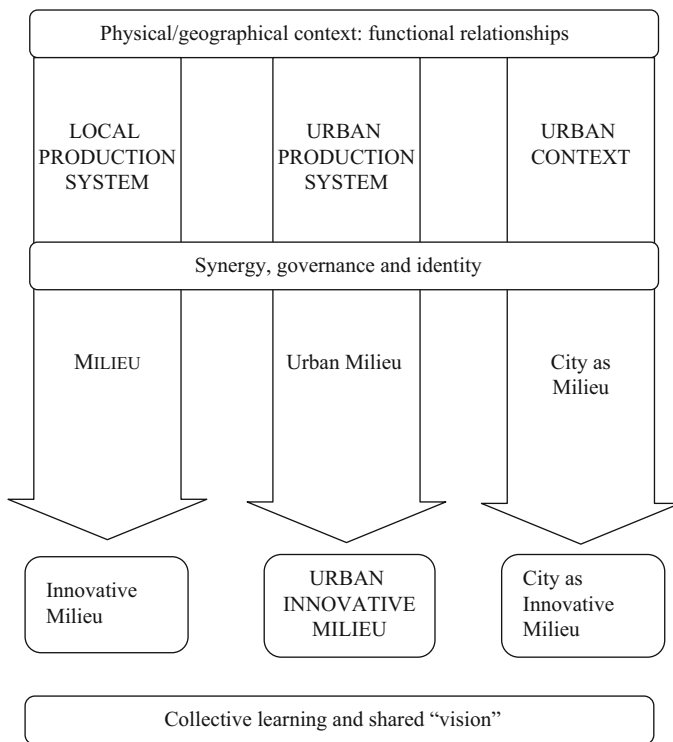
Fig. 11.2 The urban milieu and the city as a milieu. Source: Camagni (1999)

assign to it a dynamic comparative advantage. In fact, urban competitiveness and its continuous recreation in time may be linked to the following elements:

(a) the city is the natural location site of *production services* (in a degree which is proportional to their quality and rarity), a sector which is responsible for the level (and growth rate) of the efficiency of the local (urban, regional) industrial sector. According to Thompson (1968): "the economic base of the larger metropolitan area is the creativity of its universities and research parks, the sophistication of its engineering firms and financial institutions, the persuasiveness of its public relations and advertising agencies, the flexibility of its transportation networks and utility systems, and all the other dimensions of infrastructure that facilitate the quick and orderly transfer from old dying bases to new growing ones".[4] In the empirical analysis, we will call these kinds of advantages, which are typical of urban areas and which support innovative activity in cities, with the label "dynamic urbanisation economies";

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[4]Please note the dynamic element constituted by the term "transfer", meaning the continuous shift of local specialization and the relaunching of the local competitiveness through it.

(b) the city is the natural location site of small and medium firms (incubator hypothesis) which are by definition the schumpeterian innovation agents;
(c) the city is the natural location site of industries and products in the early, pioneering phases of their life-cycle[5];
(d) similar to the previous one is the hypothesis that metropolitan areas play a mayor role in the phases of radical renewal and rejuvenation of products, when a strict interaction is demanded among different functions of the firm, usually spatially dispersed: engineering (mastering of technologies), R&D (mastering of products), marketing (mastering of demand) (Camagni 1988): a large city supplies a barycentric location for all these functions.

All these reflections were developed in the context of location theory; they may be easily utilised in an evolutionary context characterised by synergetics and learning processes.

11.3 Empirical Evidence: Milieu Behaviours in Metropolitan Cities

The conceptual relationship between the two concepts presented above achieves more emphasis if it is tested at an empirical level. For this reason, the present work aims at providing empirical evidence which tests:

– the existence of any milieu behaviour in firms located in metropolitan regions and whether it is reasonable to speak about an urban milieu or of an urban production milieu (the present section);
– whether milieu economies (i.e. the advantages stemming from milieu behaviours) are more conducive to innovative behaviours than dynamic urbanisation economies, which are typical externalities of urban areas (Sect. 11.4).

The first theoretical hypothesis to be tested is thus the existence of a "milieu" behaviour in firms located in metropolitan regions.

The empirical analysis is based on a database which contains 159 observations, nearly equally distributed among five cities, namely London, Amsterdam, Milan, Stuttgart and Paris.[6] Interviewed firms belong to both high-tech and low-tech

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[5]This idea was first developed by Vernon with reference to a spatial setting in 1957, well before his well known 1966 article referring to industrial evolution.

[6]The empirical analysis on the above theoretical reflections is based on a database built within an ESRC research project led by Oxford Brookes University and carried out by a research group composed of national subcontractors, one for each case study city, namely Amsterdam, London, Milan, Paris and Stuttgart. In each "metropolitan city" (NUTS 3 level), firms of different sectors were interviewed with a common questionnaire related to their innovation activity. The results for each city are contained in Simmie (2001). For Amsterdam, Jan Lambooy has directly participated

sectors, with a higher share for the low-tech sector. The size of interviewed firms is very different; there are small, medium and large firms, with an equal distribution of firms size among cities. Both private and public sectors are involved in the analysis, although the private sector is highly more represented (88.7% of the total sample firms belong to the private sector). All cities have a high share of firms developing product innovation, while one third of the sample firms declares process innovation.

A common questionnaire has been submitted to firms, with the intention to collect information on:

– the innovation developed;
– the geographical location of customers, suppliers and competitors;
– the forms of cooperation developed for the innovation activity;
– the sources of information used for the innovation activity;
– the sources of knowledge for their innovation activity;
– the importance of localisation factors in their innovation activities.

Most questions provided discrete information on the degree of appreciation of the different sources of information, knowledge, cooperation and locational advantages of each firm. The methodology used to transform them into continuous variables and to reduce their high number is factor analysis.[7]

The first hypothesis, i.e. whether milieu behaviours exist among firms located in urban areas and support their innovative activities, is tested through a descriptive statistical exercise, called cluster analysis, which allows for the identification of groups of firms with similar structural characteristics in terms of innovation behaviour, being run with variables characterising innovative behaviours: type of innovation, sources of information, of knowledge, of cooperation for the innovation activity, and the appreciated locational advantages for the innovation activity.

Table 11.1. shows the results obtained; four different typologies of innovative behaviours emerge, which are characterised by the size of the firm, and by the relative sectoral specialisation of each firm.

11.3.1 Small Firms in Specialised Sectors

A first cluster depicts the behaviour of *small firms in specialised sectors*, characterised by 94 observations, nearly 60% of the firms sample. In this cluster a typical milieu economy and networking behaviour prevails, witnessed by:

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in the work, providing useful, thorough and stilulating ideas, contained in his chapter written with Manshanden and Endendijk. See Manshanden et al. (2001).

[7]Factor analysis is in fact a statistical technique used to identify a relatively small number of factors that can be used to represent relationships among sets of many interrelated variables. The basic assumption of factor analysis is that underlying dimensions, or factors, can be used to explain complex phenomena. The goal of factor analysis is thus to identify the not-directly-observable factors based on a set of observable variables, reducing their number without losing too much of their explanatory power. The results of the factor analysis are contained in Capello (2001a).

Table 11.1 Results of the cluster analysis

	Small firms		Large firms	
	(<99 employees)		(>99 employees)	
	Small firms in specialised		Large firms in specialised sectors	
	(94 observations=59.1% of the sample)		(45 observations=28.3% of the sample)	
	Market size:		*Market size:*	
	* National	0.11	* Non-European	−0.44
	* European	0.16	* Non-international	−0.24
	* International	0.03		
	Innovation:		*Innovation:*	
	* Imitative	0.05	* Breakthrough	0.53
	Sources of knowledge:		*Sources of knowledge:*	
	* Local innovative suppliers	0.05	* External suppliers	0.32
	* Consultancy services	0.004	* Ex-colleagues	0.26
Specialised sectors (location quotient > sample mean)			* Scientific research centres	0.06
	Sources of cooperation:		*Sources of cooperation:*	
	* Cooperation with innovative local customers	0.06	* Cooperation with external suppliers	0.1
	* Cooperation with innovative local suppliers	0.22	* Cooperation with innovative local suppliers	0.22
	* Cooperation with other firms	0.05	* Cooperation with innovative R&D centres	0.4
			* Cooperation with other firms	0.74
	Sources of information:		*Sources of information:*	
	* Information from scientific journals	0.59	* Internal information	0.38
			* Information from R&D centres	0.4
			* Technological information	0.59
			* Information from scientific journals	0.99
	Locational advantages:		*Locational advantages:*	
	* Presence of ex-colleagues and friends	0.03	* Presence of ex-colleagues and friends	0.49
	* Proximity to infrastructure	0.03	* Proximity to supp. and customers	0.45
	* Proximity to services to firms	0.06	* Proximity to information	0.02
	* Proximity to suppliers and customers	0.01	* Proximity to high-quality public services	0.21
			* Proximity to R&D centres	2.8

(continued)

Table 11.1 (continued)

	Small firms		Large firms	
	(<99 employees)		(>99 employees)	
	Small firms in specialised		Large firms in specialised sectors	
	(94 observations=59.1% of the sample)		(45 observations=28.3% of the sample)	
	Small firms in non-specialised sectors (14 observations=8.8% of the sample)		*Large firms in non-specialised sectors (6 observations=3.8% of the sample)*	
	Market size:		*Market size:*	
	* Local and regional	0.23	* Local and regional	0.015
	Innovation:		*Innovation:*	
	* Breakthrough	0.26	* No particular innovation	
	Sources of knowledge:		*Sources of knowledge:*	
	* External customers	0.29	* External customers	0.28
	* Consultancy services	0.17	* ex-colleagues	0.07
Non-specialised sectors (location quotient < sample mean)			* Scientific research centres	0.05
			* Qualified labour market	0.09
	Sources of cooperation:		*Sources of cooperation:*	
	* Cooperation with external suppliers	0.08	* Cooperation with R&D centres	0.007
	* Cooperation with other firms of the group suppliers	0.18	* Cooperation with other firms of the group	0.4
			* Cooperation with innovative R&D centres	0.4
			* Cooperation with other firms	0.74
	Sources of information:		*Sources of information:*	
	* Information from ex-colleagues	0.07	* Information from ex-colleagues	0.01
			* Internal information	0.03
			* Information from R&D centres	0.07
	Locational advantages:		*Locational advantages:*	
	* Proximity to R&D centres	1.65	* Proximity to competitors	0.15
	* Proximity to customers and suppliers	0.18	* High life quality standard	0.14
	* Proximity to infrastructure	0.11		
	* Proximity to services to firms	0.14		

Values = deviance from the sample mean
Source: Capello (2001a)

– local innovative suppliers, a channel through which collective learning takes place are one of the sources of knowledge for innovative activity;
– innovative local customers and suppliers are the main sources for cooperation, together with cooperation with other firms, witnessing the importance of local economic interactions and networking mechanisms in innovation process of small firms;
– an industrial atmosphere, suggested by the presence of ex-colleagues and friends, and by the proximity of suppliers and customers, describes the locational preferences of these firms. This suggests that even the most appreciated locational advantages of these firms reflect a "milieu" approach. However, these firms also appreciate proximity to infrastructure and to services to firms, more related to their urban location.

11.3.2 Small Firms in Non-Specialised Sectors

A second cluster depicts the behaviour of *small firms in non-specialised sectors*, characterised by 14 observations (8.8% of the sample): interestingly enough, this group of firms behaves in a completely different way from the previous one. These firms seem to represent small branches of large firms, choosing an urban location for different purposes:

– to control the final market (proximity to customers);
– to control specific suppliers (proximity to suppliers);
– to take advantage from a large urban location (proximity to services to firms, to consultancy firms);
– to take advantage from an advanced scientific environment (proximity to R&D centres).

The interaction of this group of firms with local actors and local institutions is so weak, that it is hard to envisage any territorial embeddedness, any kind of spatial interaction among local economic actors:

– customers external to the area are envisaged as the main sources of knowledge;
– the most appreciated channels for cooperation are external customers and suppliers, or with other firms of the same group;
– the locational advantages are envisaged in traditional urbanisation economies.

11.3.3 Large Firms in Specialised Sectors

A third group depicts the behaviour of large firms in specialised sectors, which represent nearly 9% of the firms sample (14 observations). A third and rather peculiar behaviour emerges from these firms: they behave as large firms, in general appreciating their urban location and taking advantage from the scientific

environment of the large metropoly. However, they also seem to appreciate "milieu economies", determined by the high specialisation and concentration of the sector in which they operate. The sources of knowledge and the strategic information sources for their innovative activity are typical of large firms:

– external suppliers and scientific research centres are the main sources of knowledge;
– internal information is the primary source of information;
– the scientific environment in which firms operate plays a key role in their innovative activity. One of the most appreciated sources of knowledge are R&D research centres, which are also appreciated as locational advantages;
– the presence of highly qualified public services (schools, hospitals and public facilities), already envisaged by previous studies as one of the main reasons for a metropolitan location of multinationals.

The importance of "milieu economies" for large specialised firms emerges from some elements like:

– the appreciation of proximity to customers and suppliers as important locational advantages;
– cooperation with innovative local suppliers (a traditional collective learning channel) is a way through which firms feed their innovative activity.

11.3.4 Large Firms in Non-Specialised Sectors

The fourth cluster is characterised by large firms in non-specialised sectors, in a number of 6 (3.8% of the firms sample). These firms reflect a typical behaviour of a large firm, which appreciates the central location, through:

– information from scientific research centres;
– knowledge from cooperation with scientific research centres;
– a highly qualified labour market.

The sources of development and of creative activity of these firms do not stem from the local environment but:

– either from knowledge internal to the firm;
– or from external resources: external customers, external suppliers, cooperation with other firms of the group.

The reasons for the choice of a metropolitan location of these firms seem to be related to:

– a high life quality standard, as previously mentioned also in the case of large specialised firms;
– a control on the competitors and on market shares.

The definition of these four different behaviours provides two important results for our analysis. The first important element achieved via this descriptive analysis is that a milieu behaviour can exist also in urban areas; some firms appreciate and take advantage of the interaction with local economic actors, of cooperation with suppliers and customers which stimulate their innovative activity. One can easily argue that these firms appreciate the existence of mechanisms of socialised knowledge which feed their innovative capability and pushes them towards innovative behaviour.[8]

The second rather interesting result of our analysis is that firms appreciating this kind of spatial economies can be defined according to:

– from one side, their size;
– from the other, the degree of specialisation of the sector in which they operate.

As far as the size of the firm is concerned, in general small firms appreciate milieu economies more than large firms do, which, on the contrary take more advantage from dynamic urbanisation economies (cooperation with research centres, a highly qualified labour market). However, when also the specialisation of the sector in which firms operate is taken into consideration, another perspective emerges: large specialised firms tend to feed their innovative activity with local specialised knowledge, and seem to appreciate not only urbanisation economies but also milieu economies which stem from the high degree of specialisation of the sector in which they operate. On the contrary, small firms operating in non-specialised sectors do not seem to appreciate milieu economies and rather tend to take advantage from their central location.

The interaction of the two above mentioned elements explains the behaviour of firms. Figure 11.3 summarises this important result, by showing the importance of the interplay of the two above mentioned elements depicting the behaviour of firms in the different spatial economies. Two indices are calculated, namely the cooperation with research centres and the cooperation with innovative suppliers, as proxies respectively for dynamic urbanisation economies and milieu economies (i.e. collective learning), giving rise to the following results:

– both non specialised and specialised large firms take advantage of dynamic urbanisation economies;
– milieu economies are appreciated by both large and small firms operating in more specialised sectors;

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[8]A similar result has been found for what concerns the innovative behaviour of firms in the metropolitan area of Milan (see Capello 2001b).
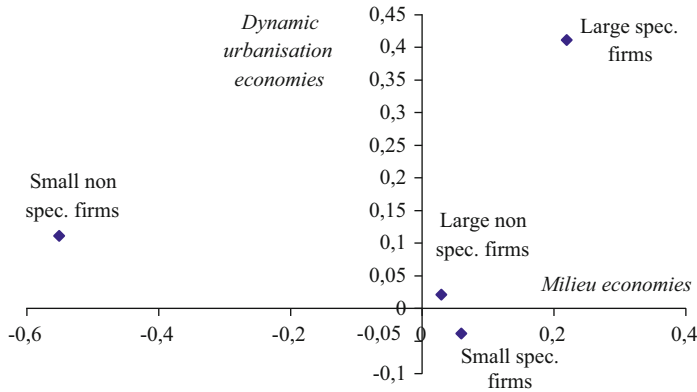
Fig. 11.3 Dynamic urbanisation economies vs. milieu economies for the four clusters. Source: Capello (2001a)

– small firms, which by definition operate in non-specialised sectors, do not take advantage of milieu economies, but rather appreciate dynamic urbanisation economies in their innovative activity.

The cluster analysis presented above shows that small specialised firms located in metropolitan cities appreciate milieu economies for developing their innovative activity. Another interesting suggestion put forward by the milieu innovateur theory is that within the milieu, two kinds of co-operation processes are at work (Camagni 1991):

– a set of mainly informal, 'non-traded' relationships—between customers and suppliers, private and public actors—and a set of tacit transfers of knowledge taking place through the individual chains of professional mobility and inter-firm imitation processes;
– more formalised, mainly trans-territorial co-operation agreements—among firms, collective agents and public institutions—in the field of technological development, vocational and on-the-job training, infrastructure and service provision,[9] which represent an organisational model between pure market and hierarchy.

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[9]"Regional milieux provide collective learning processes essential to innovation, but increasingly these informal mechanisms are insufficient either to initiate or to sustain creative activity as technical-economic complementarities force production chains to incorporate extra-regional sources of innovation". (...) Far from constituting an alternative to spatial dispersion, localized agglomeration becomes the principal basis for participation in a global network of regional economies" (Gordon 1989).
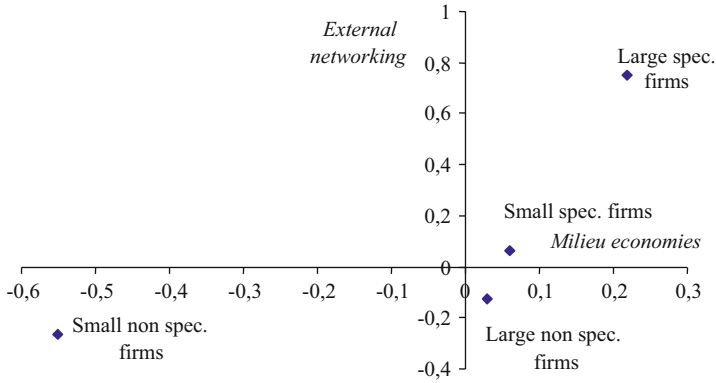
Fig. 11.4 External networking and milieu economies for the four clusters. Source: Capello (2001a)

The former kind of relationship is in fact the 'glue' that creates a milieu effect; it is complemented by the latter, more formalised kind of relationship called "network relationships". Both sets of relationship may be regarded as tools or 'operators' that help the (small) firm in its competitive struggle, enhancing its creativeness and reducing the dynamic uncertainty intrinsically embedded in innovation processes.

In particular, the second kind of cooperation, networking behaviour, seems to be an efficient way for small firms to overcome extremely turbolent and innovative economic phases, representing a way to obtain information and knowledge outside the area.

We have attempted to test this hypothesis also in the case of our metropolitan firms. Two proxies are built, one for the existence of the milieu relationship (cooperation with innovative suppliers), the other for the network (cooperation with other firms), and presented in Fig. 11.4.

The results are quite interesting. Specialised firms take advantage of both milieu economies and external networking, reflecting a typical behaviour of innovative firms in milieu areas. On the contrary, non specialised firms, despite their size, do not develop any kind of interfirm innovative cooperation activity. The latter, on the contrary, seem to rely on internal networking, measured through the degree of cooperation with other firms of the same group (Fig. 11.5).

11.4   Empirical Evidence: Dynamic Urbanisation Economies vs. Milieu Economies in Innovative Activity

One of the main result of the previous analysis is that both milieu economies and dynamic urbanisation economies play a role in the innovative activity of firms, the latter being the traditional externalities that support innovation in urban areas. However, the previous analysis also shows that the size of the firm and the sectoral specialisation help explaining the choice of firms for "milieu economies" rather
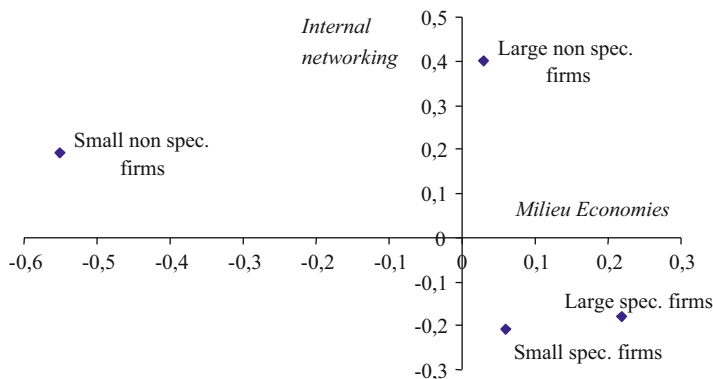
Fig. 11.5 Milieu economies and internal networking for the four clusters. Source: Capello (2001a)

than "dynamic urbanisation economies"; small specialised firms are more inclined to exploit milieu economies while large firms are more in favour of dynamic urbanisation economies. In this part of the analysis our aim is to measure:

- from one side, the impact of milieu economies and dynamic urbanisation economies on firms innovative capacity;
- from the other side, how this impact changes according to the size of firms and the sectoral specialisation in which firms operate.

For this purpose, we estimate the following two models:

$$I = \alpha_1 + \beta_1 \ln ql + \nu_1 \ln S + \varepsilon_1 due + \varphi_1 me + \eta_1 (me^*ql) + \lambda_1 (me^*S) \quad (11.1)$$

and

$$I = \alpha_2 + \beta_2 \ln ql + \nu_2 \ln S + \varepsilon_2 due + \varphi_2 me + \eta_2 (due^*ql) + \lambda_2 (due^*S) \quad (11.2)$$

where:
I = the innovation capacity of a firm,
ql = the location quotient of the sector in which the firm operates,
due = dynamic urbanisation economies,
me = milieu economies,
S = size of the firm.

The two models differ for what concerns the terms of interaction between dynamic urbanisation economies or milieu economies and the firms size or location quotient. In this case, with the estimate of the first model (Eq. 11.1), one can capture the role of milieu economies on innovation activities of firms, and the way in which this role changes according to different firms size and degree of sectoral specialisation. The second model, on its turns, captures the same effect for dynamic

urbanisation economies, since it relates the impact of dynamic urbanisation economies on innovation capacity of firms for different firms size and degree of sectoral specialisation (Eq. 11.2). To measure such a role, it is simply required to calculate the first derivative of innovation activities for respectively dynamic urbanisation economies and milieu economies:

$$\frac{\delta I}{\delta me} = \varphi_1 + \eta_1 ql + \lambda_1 S \qquad (11.3)$$

and

$$\frac{\delta I}{\delta due} = \varepsilon_2 + \eta_2 ql + \lambda_2 S \qquad (11.4)$$

and calculate the way in which it varies according to different values of firms size or location quotient. The models are estimated by using the following proxies:

– for what concerns the size, we used the turnover of firms (in euro) (expressed in logarithmic terms). Turnover was available only for 126 firms, limiting this part of the analysis to these 126 observations;
– for the specialisation index, we used the share of employment in one sector in a city compared with the same share of employment at the national level (location quotient, expressed in logarithmic terms);
– for the dynamic urbanisation economies, we used the cooperation with scientific research centres and universities strategic for the innovation activity (factor 5 of factor analysis b);
– for the milieu economies, we used the cooperation with local innovative suppliers for the innovation (factor 3 of factor analysis b).

The results of the estimates of Eqs. (11.1) and (11.2) are presented in Table 11.2, while the results of Eqs. (11.3) and (11.4) are presented in Fig. 11.6. The estimated models underline that:

– imitative innovation activity (measured as the capacity of firms to introduce a new innovation) is developed by small specialised firms, operating in the industry sector, taking advantages of milieu economies, and in particular of collective learning mechanisms (model 1, Table 11.2). Dynamic urbanisation economies do not provide any sort of help, and are even negatively correlated;
– interestingly enough, the interaction terms between size, specialisation and agglomeration economies are statistically significant, with opposite signs; milieu economies are related negatively to the size of firms, and positively to the degree of sectoral specialisation (model 1), while dynamic urbanisation economies are positively linked to the size of the firm and negatively to the location quotient (model 2).

Table 11.2 Innovation, milieu economies and dynamic urbanisation economies (Linear regression models)

Independent variables	Model 1	Model 2
Constant	1.65 (3.63)	−0.24 (−1.95)
Location quotient (ln)	0.38 (3.22)	0.31 (2.38)
Turnover (ln)	−0.09 (−3.63)	−0.06 (−2.40)
Milieu economies	0.97 (2.12)	0.21 (2.47)
Dynamic urbanisation economies	−0.17 (−2.20)	−0.60 (−1.70)
Service firms (1=service firm)	−0.47 (−2.53)	
Milieu economies * turnover (ln)	−0.04 (1.70)	
Milieu economies * location quotient (ln)	0.21 (1.79)	
Dynamic urbanisation economies * turnover (ln)		0.03 (1.26)
Dynamic urbanisation economies * location quotient (ln)		−0.24 (−1.95)
Goodness of fit (R-square)	0.24	0.20
Number of observations	126	126

T-student in brackets

Dependent variable: Imitative innovation (factor 2 of factor analysis a)

Milieu economies = Cooperation with local innovative suppliers for the innovation (factor 3 of factor analysis b)

Dynamic urbanisation economies = Cooperation with scientific research centres and universities (factor 5 of factor analysis b)

In Fig. 11.6 we present the results of Eq. (11.3). Interesting results emerge:

– the impact of dynamic urbanisation economies on firms innovative activities increases with firms size, i.e. larger firms appreciate dynamic urbanisation economies more than small firms do (Fig. 11.6a);
– on the other hand, the impact of dynamic urbanisation economies on firms innovative capacity decreases when the degree of specialisation of the sector in which firms operate increases. Highly specialised firms tend to get quite a low externality from an urban environment (Fig. 11.6b).

For what concerns Eq. (11.4), the following results are achieved:

– the impact of milieu economies on firms innovative capacity decreases with the firms size, witnessing once again that milieu economies are more appreciated by small firms (Fig. 11.6c);
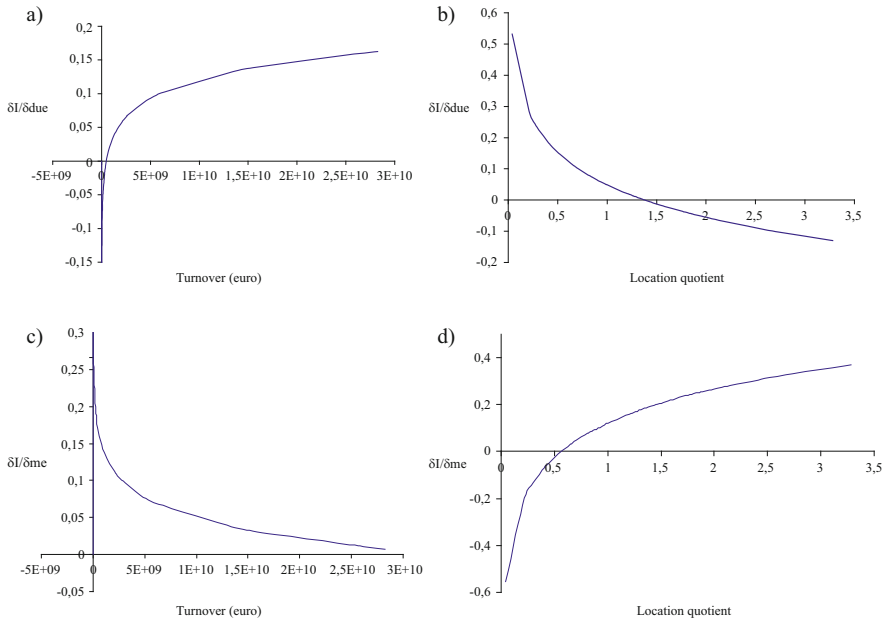
Fig. 11.6 Impact of dynamic agglomeration economies on firms innovation activities by firms size and sectoral specialisation. Source: Capello (2001a)

– more interesting, the impact of milieu economies on firms innovative capacity
   increases when the location quotient increases; this shows once again that in
   cities milieu economies take place only in specialised sectors, and give rise to
   what has been labelled an "urban production milieu". They are in fact confined
   to specialised sectors, where firms recreate the sort of industrial specialised
   territorial atmosphere typical of a milieu (Fig. 11.6d).

11.5   Conclusions

The most important conclusion achieved in the paper resides in the proof of the
relevance of the milieu approach for a modern and renewed interpretation of the
City as a spatial archetype. Cities and Milieux share many characteristics, not really
in their geographical form but in their intrinsic role in the shaping of the spatial
economy; this role resides, according to the milieu innovateur's theory, in the
reduction of dynamic uncertainty and in the supply of the durable substrate for
learning processes and for the tacit transfer of know-how and non-codified non--
material assets among territorial actors.

   This conclusion is proved by quantitative empirical evidence; the old debate on
urbanisation versus localisation economies on urban productivity is in this case
reinterpreted in terms of milieu economies (expressed in the capacity of the city to

produce knowledge in a socialised way, through a strong and innovative interaction among economic actors) versus dynamic urbanisation economies (i.e. channels of knowledge acquisition typical of the large city, like innovative interaction with universities and research centres).

Thanks to the existence of a database on firms innovative behaviour in five European cities, some results are achieved which suggest that:

– in the metropolitan cities analysed, urban production milieux exist, in that in these cities some firms take advantage of milieu economies, in the form of collective learning. For these firms, in fact, innovative cooperation with local suppliers and customers is one of the main determinants for their innovation activities. This is verified by the importance attributed to sectoral specialisation in the definition of both the innovative behaviour of firms and the determinants of innovation activities;
– the reply to the question whether dynamic urbanisation economies or milieu economies are more conducive to innovative behaviour is according to these results misleading. From the results achieved, it seems that the reply very much depends on the size of the firm and on the sectoral specialisation in which they operate. Small specialised firms, probably part of an industrial filière, take advantage of the traditional dynamic synergies typical of a milieu behaviour; large firms, on the contrary, seem to prefer dynamic urbanisation economies, oriented towards the acquisition of knowledge stemming from their urban location. These results are witnessed by a quantitative analysis on the impact of dynamic urbanisation economies and milieu economies, and on the way this impact changes according to the different size of firms and degree of sectoral specialisation.

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Static vs. Dynamic Agglomeration Economies: Spatial Context and Structural Evolution Behind Urban Growth

12

Roberto Camagni, Roberta Capello, and Andrea Caragliu

12.1 The Agglomeration Economies-Urban Growth Nexus: Some Questionable Logical Shortcuts

For at least two decades, cities have been back on the policy agenda in both Europe and the US as the pivotal places where the new societal goals of enhancing competitiveness, wellbeing, sustainability and cohesion may find their driving forces—and where they will also face the main complexities and contradictions (Glaeser et al. 1992; Camagni and Gibelli 1996; Glaeser 1998; EC 1998; Scott 2001). At the same time, on the more stylized and analytical dimension but closely intertwined with the policy debate, the concept of agglomeration economies and its relation with spatial economic performance has maintained a central role.

After the birth of the New Economic Geography (NEG), the presence of agglomeration economies ("*the pervasive influence of some kind of increasing returns*") (Krugman 1991, p. 5) was used to remind us of the inescapable concentration trends of both firms and households in space and the consequent "*cumulative process of regional divergence*" (ibid., p. 11), bringing us back to the well-known theses of Myrdal (1957) and Williamson (1965).

More recently, agglomeration economies have been cited as the driving forces behind the growth of mega-cities and large city-regions, apparently the most successful territories in the world economy (Fujita et al. 1999; Scott 2001; Rosenthal and Strange 2001; Melo et al. 2009). The further logical step has been the expectation that agglomeration economies would directly lead to growth,

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through the performance of large and mega-cities, in line with the forecasts of NEG models (World Bank 2009; Glaeser 2011).

This straightforward logic offers an easy, powerful and apparently spontaneous mechanism upon which the relaunch of aggregate productivity may rely in advanced and developing countries: boosting some mega-cities at the expense of smaller and medium-sized ones may substitute for the previous rural-to-urban and agriculture-to-industry shift of the glorious 40 years after the war, in the present context of enduring productivity slowdown.

The main conclusion was already questioned on empirical grounds in the case of OECD countries (OECD 2006), European countries (Dijkstra et al. 2013), and the US (Partridge et al. 2009). In the former case, an inverted U-shaped curve for productivity levels was found, underscoring the presence of agglomeration diseconomies above a certain size. In the latter case, while no doubt exists concerning the higher productivity of larger cities, no recent evidence has shown the superiority of large cities in terms of productivity growth in recent years.

The main conceptual point of this paper is the crucial distinction between a static and a dynamic definition of urban productivity. In the former case, a comparison among cities across space, in the absence of a time dimension, points out the superior efficiency *level* of larger vs. smaller cities and explains the main reasons for this—largely accepted—fact; in the latter case, a comparison among cities in terms of time performance indicates the possible drivers of efficiency *increases* for each city size, especially in terms of the capacity to change a city's internal characteristics which may act as structural constraints on its growth.

When, implicitly or explicitly, a direct link is established between static agglomeration economies and growth—arguing for the superior time performance of large cities and the desirability of a world of mega-cities—a questionable logical shortcut is established. The presence of increasing returns to urban scale only indicates a superior efficiency of large cities, not a trend towards increasing urban size automatically implying productivity growth. The "*association between urbanization and development (. . .) is an equilibrium not causal relation*" (Henderson 2010, p. 518) and "*urbanization per se does not cause development*" (p. 515). Along an average productivity curve rising with urban size, reading the size-derivative as a time-derivative is mistaken and implies a circular reasoning: 'if a city grows demographically, it will grow economically'.

There is an evident missing link in the above logic, although it could be filled by considering an appropriate dynamic process, e.g. the attractiveness of larger cities for footloose activities and households. But in this case, the attractiveness should reside in *net* urban benefits, discounting the higher labour and land costs and general size disamenities, not in *gross* urban benefits (GDP per head, higher labour productivity or pecuniary externalities) as in Krugman (1991) and the NEG literature. In fact, net urban benefits are much more homogeneous across urban sizes (Fujita 1998, chap. 5), while abstract equilibrium models of city systems expect full homogeneity, as also suggested by the insufficient empirical intensity of inter-urban migrations (Dijkstra et al. 2013).

Moreover, expecting productivity increases only from large cities would not be acceptable: also smaller cities present a positive size-derivative of average urban benefits, and the potential efficiency increase would also be beneficial to the entire system! In fact, much will depend on the form of the returns curve (second derivative) and on the historical external conditions favouring leading or follower cities (Dijkstra et al. 2013).[1]

A third shortcoming consists in the treatment of the urban production function. If only one independent variable (size) is used to highlight urban agglomeration economies, numerous implicit hypotheses are assumed: a unique production function for small and large cities, a continuous increase with size of the other determinants of productivity ('malleability'), the impossibility of making use of either of them to achieve productivity goals. In fact, the malleability of production factors is imperfect, and small cities are structurally different from large ones. In a dynamic perspective, many structural variables present large indivisibilities and time discontinuities in their development, which may hamper urban growth and thus determine decreasing returns on other production factors and ultimately a stalemate in the growth of both small and large cities.

This paper questions the link between urban size and urban growth on conceptual and theoretical grounds on the basis of the previously discussed logical shortcuts (Sects. 12.2 and 12.3); in Sects. 12.4 and 12.5 a more complex stylized model of urban advantages and urban growth is presented; and, finally, the model is subject to empirical validation in the case of EU countries in Sects. 12.6–12.8.

In both a static and a dynamic perspective, the role of pure agglomeration economies in boosting productivity levels and growth is inspected. However, many other elements contributing to the generation of urban benefits, often but not necessarily correlated with urban size, are also included: the quality and density of high order functions, the capability to establish network cooperation, the demographic and economic characteristics of the urban context.

Taken separately, these conceptual issues were not ignored by the previous literature. The relevance of the wider urban context for the efficiency of cities, and of small ones in particular, has been discussed in Alonso (1971, 1973); Meijers (2013); Burger et al. (2014). The need to make other development factors explicit beyond urban size has been suggested in Camagni et al. (1986); and Capello (2009), among others, while the necessity to use a net indicator of competitive advantage in the interpretation of urban attractiveness and potential growth has been prompted by Richardson (Richardson 1971, 1972), and reprised in Albouy (2009) and de Groot et al. (2015). Long-distance city-networks have been found to enhance economic efficiency in partner cities (Camagni 1993; Johansson and Quigley 2004; Boix and Trullen 2007). However, these contributions mainly remained

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[1]Camagni (2014) shows that the annual GDP growth rates of EU FUAs in the period 1995-2008 were significantly and negatively related to size, in line with some results in Dijkstra et al. (2013), while early evidence during the crisis period (2008–2010) shows a slightly positive relationship, suggesting a superior resilience of larger urban areas.

separated, often co-existing with other, opposite views in a long-standing but non-conclusive scientific debate. The novelty of this paper lies in the effort of simultaneously addressing these issues in a theoretically consistent way, in order to highlight the complex determinants of the agglomeration-development nexus.

12.2 Agglomeration Economies and Urban Size: The Micro-Industrial Approach

The literature on static agglomeration economies—defined as productivity advantages associated with urban size—has highlighted three main aspects: indivisibilities, synergies, and physical proximity (Capello 2009). Indivisibilities occur when the scale of agglomerated activities adds to productivity by causing shifts in firms' production or cost curves (Rosenthal and Strange 2001; Cohen and Paul Morrison 2009), or allows the city to adopt more advanced infrastructure systems (underground transportation, airports) boosting aggregate urban efficiency. Indivisibilities prevail when an industrial perspective is adopted: some sectors depend more on large-scale production, and some sectors derive high advantages from the presence of other sectors generating efficient and large 'industrial complexes' (Isard and Schooler 1959). A large body of literature thus measures the extent to which the presence of a mix of industries or a single industry generates greater agglomeration advantages (Carlino 1980; Henderson 1985).

Synergies relate to the socio-cultural dimension: trust, sense of belonging, cultural and religious homogeneity, fostering the intensity of local interactions, and giving rise to increasing returns via production/transaction cost minimisation (Becattini 1989) or via innovation-enhancing processes (Camagni 1991; Storper 1995). Proximity is by definition linked to the geographical dimension of agglomeration and interaction effects: if information and transportation costs were nil, in the absence of scale economies there would be no reason to concentrate activities. In this sense, agglomeration economies are 'proximity economies'.

The previous three elements are typical of the three different approaches to the sources of agglomeration economies. Technical scale effects (labour-market indivisibilities, production indivisibilities) prevail in the micro-industrial approach to agglomeration economies, generating a reduction in production costs. Physical proximity is the domain of the geographical approach, while synergy and interactions (limiting transaction costs) prevail in a macro-territorial approach. These approaches differ in terms of the main sources of static agglomeration economies and in the interpretation of dynamic efficiency behind the concept of agglomeration economies.

Early studies on agglomeration economies theoretically explained and empirically tested whether the scale of agglomerated activities adds to productivity. The standard approach was based on a production function framework, with the following general specification (Melo et al. 2009):
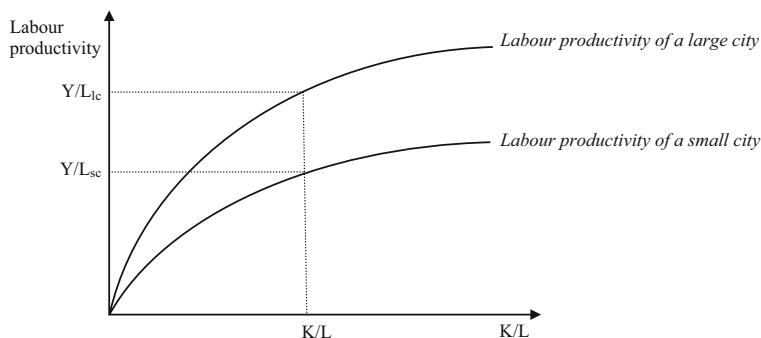
Fig. 12.1 Static effects of agglomeration economies

$$Y_{it} = A_{it}G(S_{it})F(X_{it}) \tag{12.1}$$

where Y is the private output in region i at time t which depends on a technology function $F(X)$ providing the mix of input factors L and K used in the city, and two shift terms A and $G(S)$ refer to a technological progress *à la* Solow and urban size efficiency, respectively.

Figure 12.1 graphically represents Eq. (12.1) using a traditional Cobb-Douglas production function, under the assumption of decreasing returns. Agglomeration economies allow, for a given capital/labour ratio, achieving higher labour productivity. Agglomeration economies thus explain part of Solow's residual by distinguishing urban size effects from technical progress.

Early approaches to the economics of urban size mainly concerned scale economies in the supply of private and public fixed capital, and the productivity of urban infrastructure. Some erroneously identified optimal city size as the size minimizing location costs, thus ignoring location advantages.[2]

In the first part of the 1970s, theorization was followed by empirical studies analyzing per capita expenditure on public services (Ladd 1992): for instance, Alonso (1971) and Mera (1973) estimate, on a sample of American and Japanese cities respectively, that per capita public expenditure was greater for cities with more than one million inhabitants. Beyond that threshold, per capita expenditure increased, suggesting the existence of a U-shaped curve for average urban costs.[3] Hirsch showed that this rule applied only to specific services (Hirsch 1968), while the average cost curve had either a constant shape w.r.t. urban size for some

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[2]Alonso stressed the wrong tendency of many to look for "optimal city size" only by minimising the location cost function. This would be sensible only if per capita output were constant (Alonso 1971, p. 70).

[3]A doubt persists concerning these results: in larger cities higher per capita expenditure may be due more to a greater willingness to pay for public services than to scale diseconomies. Moreover, the difference in per-capita income between large and small cities exceeds the difference in average costs; therefore, if an optimal size exists, this is characterised more by productivity than by average costs.

services, like education, or a decreasing functional shape for others, like public utilities.

A large body of literature empirically tested the role of agglomeration economies as sources of productivity increases. Alonso finds that average labour productivity is greater in American cities with more than 5 million inhabitants, showing that location costs are minimized for an urban size smaller than the one maximizing location advantages (Alonso 1971). Estimating an aggregate urban Cobb-Douglas production function on a sample of 58 American cities, Segal finds that metropolitan areas with more than 3 million inhabitants are 8% more productive than other cities (Segal 1976). In a cross-sectional study on 230 American cities, Marelli obtained similar results: larger cities are more productive than smaller ones up to a certain threshold, beyond which productivity runs into decreasing returns (Marelli 1981). Other empirical studies found that productivity was 30% greater in the Île de France and 12% greater in Marseille, Lyon and Nice than in the rest of France (Rousseaux and Proud'homme 1992; Rousseaux 1995). For Italy, on the basis of a cross-section of 58 Italian cities, Capello (1998) finds that gross average urban benefits exhibit an inverted U shape, decreasing beyond a certain threshold.

Urban location benefits have been found to derive from diverse sources: from amenities and quality of life (Blomqvist et al. 1988; Roback 1982; Rosen 1979; Carlino and Saiz 2008) to the qualitative characteristics of the urban production environment (Chinitz 1961, 1980), or the characteristics of the city interpreted as a social facilitator (Ciccone and Hall 1996; Martin et al. 2011).

One of these elements, namely the economic functions hosted in cities, casts doubts on the way agglomeration economies are identified and measured. Cities in fact differ in terms of functions and specialisation (Henderson 1985). Therefore, using the same urban production function for a cross-section of cities in order to estimate a universally valid optimal city size is questionable: "*we may expect the efficient range of city sizes to vary, possibly dramatically, according to the functions and the structure of the cities in question*" (Richardson 1972, p. 30).

In the real world, however, the quality of urban functions does not always correlate with city size. In fact, a Christallerian logic cannot explain why a city like Zurich, with only 350,000 inhabitants, is specialised in international finance exactly like New York and Tokyo. The presence of high-level functions in a city may well explain its higher productivity levels and should not be mechanically related to urban size (Capello 1998).

While in the first stage of the theoretical reflections, agglomeration economies were interpreted as 'technological' externalities—advantages stemming from public services, competence, knowledge and activity diversification—in the more recent debate 'pecuniary' externalities play a major role in explaining agglomeration forces in the form of labour market pooling and specialized and efficient intermediate input suppliers (Krugman 1991). Pecuniary advantages for interrelated firms are supposed to generate cumulatively the attractiveness of a concentrated production context: whence derives the tale of a never-ending economic success of large cities. But disregarding technological spillovers as "invisible" and

"unmeasurable" (Krugman 1991, p. 53) has a double theoretical drawback. First, the abstract tale inevitably speaks about firms' 'clusters', not really about cities, forgetting the true nature of the city as a melting pot of knowledge, culture and emotions, and consequently underestimating the most important urban benefits. Second, it fails to consider the real costs of urban size, which have to be taken into account together with benefits when passing from a static picture (advantages of urban size) to a dynamic one (attractiveness and superior growth potential of larger cities).

The same pecuniary externality concept is used in the most recent interpretation of the urban specialization vs. diversification dilemma—the so called "related variety" concept (Boschma and Iammarino 2009; Frenken et al. 2007; Boschma 2005)—where complementarities among similar sectors are assumed to guarantee knowledge exchange, innovation and urban growth. The consequence is that agglomeration advantages stem only from mere input-output relationships among clustered firms, leaving no space for the wider urban context to influence urban performance. Cities are equated to pure agglomerations of firms; territory is down-scaled to physical distance or geometric space.

A last body of literature, dealing with urban productivity from an industrial perspective, is the one looking at sorting mechanisms. This literature aims at explaining wage differentials across different cities, with the clear underlying assumption that, with perfectly working labour markets, wages reflect individual productivity. The latter is explained mostly by a sorting effect, that identifies in the presence of skilled labour in an area the major explanation for a long-term cumulative process of productivity growth in cities (Combes et al. 2008).[4] While empirically convincing, this stream of studies necessarily disregards macro-territorial elements that actually make cities structurally different and, thus, more or less productive.[5]

In conclusion, a micro-economic approach seems fruitful for assessment of the productivity advantage of urban size, provided that other factors loosely correlated with urban size—like the quality of hosted functions or the knowledge spillovers typical of the urban context—are added to the picture. However, the fully accepted static relationship between size and productivity—on which a still unresolved empirical issue concerns the possible presence of diseconomies above some large critical size—is not sufficient to argue for a necessary and mechanical link between size and growth. A higher productivity of large cities does not *per se* explain attractiveness in a dynamic setting, because also location costs should be considered. Moreover, smaller cities may utilise other attributes and context advantages to boost their locational advantage.

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[4]Workers may "*sort across employment areas so that the measured and unmeasured productive abilities of the local labour force vary*" (Combes et al. 2008, p. 723).

[5]One such measurement shortcoming is exemplified by the use of local employment density as a measure of urbanisation economies.

12.3   Agglomeration Economies and Small City Efficiency: The Geographical Approach

If urban size is characterised by higher efficiency, and if higher efficiency is supposed to lead automatically to higher growth, it is not possible to understand the recent higher growth of small cities with respect to large ones.

One way to resolve this apparent contradiction between theory and reality is proposed by those scholars interested in the geographical foundations of agglomeration theories (Meijers 2013; Burger et al. 2014), who build upon and enrich the concept of 'borrowed size' developed by Alonso; *". . . a small city or a metropolitan area exhibits some of the characteristics of a larger one if it is near other population concentrations"* (Alonso 1973, p. 200). Behind this statement lies the claim that smaller places can 'borrow' some of the agglomeration benefits of their neighbours while avoiding agglomeration costs.[6]

This approach highlights the fact that urban agglomeration effects are not necessarily limited to the physical boundaries of a city, but can spill over to surrounding areas. The physical distance at which agglomeration economies are able to exert their effects is the main element in this approach, which explains why smaller cities can sometimes grow thanks to (and at the expense of) other nearby cities. This approach can explain why smaller cities can be more efficient than larger cities, as well as why efficient polycentric urban structures at local (regional) level exist where agglomeration economies are 'borrowed' from the entire urban system. The concepts of 'externality fields' (Phelps et al. 2001) or 'regional externalities' (Parr 2002) have been proposed to highlight the spatial coverage of urban advantages extending far beyond the city's boundaries.

Figure 12.2 represents the average gross urban benefits for different levels of urban size. A city enjoying *borrowed size* obtains average benefits (ALB_a) from its size (b) which are typical of a larger city (a). This means that size and proximity generate technological externalities that boost the productivity of small cities to the level of larger ones. This approach explains urban growth in an indirect way, through the same shortcut as before: small cities may be as efficient as large cities, thus attracting more people and activities. Small city growth is explained by the introduction of geographical space (geographical proximity, and not solely the size of the urban production complex) as a source of externalities and, indirectly, of growth itself.

From a theoretical point of view, the geographical approach enriches the concept of agglomeration economies within a static framework by severing the direct relationship with urban size assumed by the traditional micro-industrial approach. But, similarly to this approach, it does not identify any reasons for a limit to urban growth. Small cities grow because they can achieve higher productivity by borrowing it from larger agglomerations, and large cities grow because they exploit the attractiveness due to their own higher productivity: no threshold effect is thus identified.

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[6]Parr (2002) argues that agglomeration costs are more confined to city boundaries than agglomeration benefits.
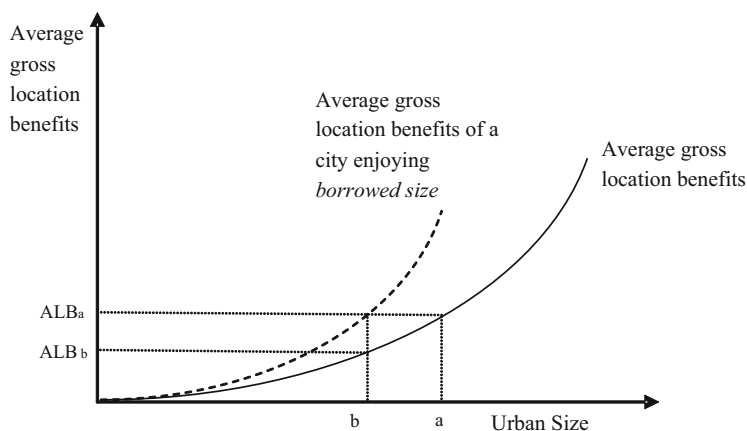
Fig. 12.2 Agglomeration economies and borrowed size

The traditional concept of 'borrowed size' mixes up population and functions, demand and supply critical mass effects, to claim that in small cities "*people can use the shopping and entertainment facilities of other cities to complement their own, businessmen can share such facilities as warehousing and business services, and labour markets enjoy a wider and more flexible range of demand and supply*" (Alonso 1973, p. 200).

From both a theoretical and empirical point of view, it seems necessary and fruitful to distinguish better between and within the two pairs. At theoretical level, through the population potential assured by the entire regional urban system, 'borrowed size' may refer directly to the advantages deriving from a pooled and diversified labour supply, from a larger market of final goods, and also from population spillovers from larger cities. On the other hand, through the potential accessibility to high-level functions, what can be called a 'borrowed function' effect may refer directly to advantages stemming from a wider labour demand, from the greater accessibility of services, and also from the physical spatial spillovers of functions from larger cities. In an empirical analysis, the two distinct critical mass effects can be separated out so as to capture the large variety of situations that occur in the real world.

The distinction between 'borrowed size' and 'borrowed functions' seems interesting since the two effects may have different intensities and different directions (signs) for different city sizes. A 'borrowed function' effect is mainly expected to yield more advantages for small cities, since they are less endowed with high-rank functions but can 'borrow' them through the easy accessibility of stronger cities in the same regional context[7]; thus, their population may be wider than expected

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[7]This effect changes in intensity according to the functions hosted; each function requires a critical mass of market in order to be efficiently produced.

(e.g. in residential suburbs or commuter towns). On the other hand, 'borrowed size' is expected to bring benefits especially to larger cities, which are better able to exploit the larger captive markets of their regional/metropolitan urban system for their service firms.

This latter effect may easily encompass another concept: that of 'agglomeration shadow' introduced by the NEG literature (Krugman 1991; Dobkins and Ioannides 2001) in order to explain the backwash effect of the presence of high-rank functions in larger cities at the expense of smaller ones. But this same effect may be partly or totally outweighed by a direct spillover effect of functions outside the borders of larger cities in search of more space or cheaper land.

A further consideration is provided by the 'city network' theory (Camagni 1993). This introduced the idea that functions can be 'borrowed' not only thanks to physical proximity to other cities, but also thanks to relationships and flows of a mainly horizontal and non-hierarchical nature among cities of similar size, even ones located far from each other (Camagni 1993; Capello 2000; Camagni and Capello 2004; Boix and Trullen 2007). While the organisational logic underlying Christaller's Central Place model is a 'territorial logic' emphasising a gravity-type control over market areas, prevailing in the network model is a different logic related to long-distance competition and cooperation regardless of the distance barrier. Whilst in the traditional Christaller theory transport costs and economies of scale were the principal forces shaping the spatial organisation of functions and cities, in the city network logic other kinds of economies come to the fore: economies of vertical integration and division of labour ('complementarity networks') and network externalities similar to those emerging from club goods ('synergy networks'). These two sources of urban advantage can be termed 'urban network externalities', and they have been recognized by the more recent literature (Hall and Pain 2006; Boix and Trullen 2007).

This step forward overcomes the limitation of the geographical approach, which considers only nearby cities boosting their efficiency thanks to 'borrowed size' or 'borrowed functions', and claims that size is not the only determinant of factor productivity and agglomeration economies. Integration into the entire urban network with long-distance cooperation agreements, together with the presence of high-order functions, may raise urban productivity levels despite limited urban size.

The previous conceptual ideas help explain why cities of intermediate size are increasingly regarded as the places that could well host urban growth in the years to come: limited city size, in fact, facilitates environmental equilibrium, efficiency of the mobility system, and the possibility for citizens to maintain a sense of identity provided that greater economic efficiency is achieved ('borrowed') through easy access to and interaction with neighbouring cities, or with distant but well-connected cities through network cooperation.

The 'borrowed size' approach seems consistent and fruitful, and it warrants deeper consideration that distinguishes among single effects: 'borrowed functions', labour market and goods market effects, demand and supply effects, physical

spillover effects of population and economic activities. All these conceptual elements can be tested empirically, especially considering the possibility that the beneficiaries may be also large cities and not just smaller ones.

12.4 A Dynamic Macro-territorial Approach: The Structural Evolution of Cities

A recent approach to agglomeration economies investigates the macro-territorial foundations of agglomeration economies (Camagni and Capello 2014). It takes the city as the main unit of analysis, with the aim to measure scale effects associated to urban size (Henderson 1974, 1985). In this tradition, the success of cities is attributed to the existence of static agglomeration economies; conversely, urban decline is explained by decreasing returns when a city reaches an excessive size (Alonso 1971; Richardson 1978).

The main idea in the macro-territorial approach is that explanation of urban growth requires true consideration of the time dimension, and that for this reason agglomeration economies in their static version must be replaced by a concept of dynamic agglomeration economies. These latter are defined as changes over time in productivity advantages associated with urban size; once the determinants of, and the preconditions for, dynamic agglomeration economies have been identified, urban growth finds a direct explanation.

This approach starts by acknowledging two bridging elements between a static and a dynamic interpretation of agglomeration economies. First, if agglomeration economies are assumed as the driving forces behind attractiveness for new activities and population, they must be conceived as net and not gross urban benefits, at a macro-urban and not micro-pecuniary level. Second, other factors contribute, together with pure size, to explaining urban efficiency levels, and changes in the intensity of these factors cause increases in agglomeration economies *irrespective of* the size of the city.

On a simplified view, in fact, efficiency increases may be taken for granted on passing from small to medium and large cities; only in very large cities should the problem of a downturn in urban returns to scale eventually emerge (Alonso 1971; Richardson 1978). Assuming a more complex view, the new theoretical conjecture claims that the exploitation of agglomeration economies is relatively straightforward within each of the three/four traditional size classes (small, medium, large, mega-cities),[8] but it implies the presence of specific limiting/enabling factors when

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[8]Commonsense leads to the identification of different size classes of cities (small, medium, large, mega) and the consideration that each class encompasses structurally similar cities (Camagni et al. 2015b). In fact, large and mega-cities are de-specialized in terms of activity sectors, and they host high-level and international functions and occupations; medium-size cities are generally more specialized and high-performing in the specialization sectors; small cities mainly host low-level skills and activities (Conti and Dematteis 1995). Mega-cities are generally organized into polycentric urban systems in order to evade some size diseconomies.

cities approach some critical instability point (Camagni et al. 2015b). Therefore, cities may experience a halt in their growth path, irrespective of their size, in the absence of these conditioning factors. These factors are by nature qualitative, and quantum leaps in their endowment are needed if agglomeration economies are fully to exert their beneficial effects. The quality of the activities hosted, the quality of production factors, the density of external linkages and cooperation networks, the quality of urban infrastructure all enable increases in productivity advantages, and a long-term 'structural dynamics' process (in the language of dynamic ecological models) via a process of urban evolution and transformation.

The explanation of a relatively good urban economic performance is not mechanically linked to the existence of static agglomeration economies. Instead, this approach highlights the conditions under which agglomeration economies may be fully exploited within each urban size class.

This approach confirms the existence of agglomeration economies, as well as the risk of agglomeration diseconomies, but this *general law works within each class of cities*. Some large cities are able to escape agglomeration diseconomies, despite their large size, while small ones can experience decreasing returns despite their small size (Fig. 12.3). The explanation of this apparent contradiction lies in the capacity of cities to overcome agglomeration diseconomies either by innovating the
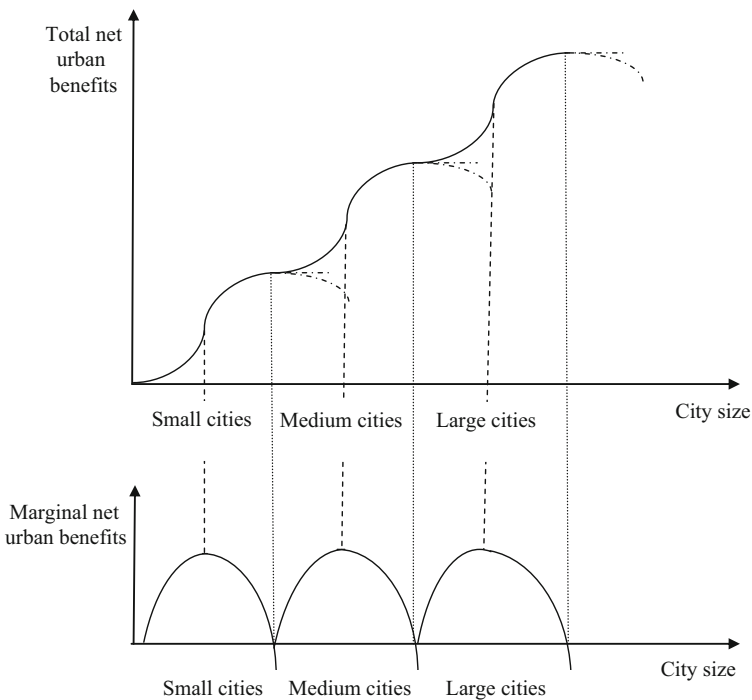
Fig. 12.3 Urban evolution in a simplified urban hierarchy (total and marginal net urban benefits by city size classes). Source: Camagni et al. (2015b)

functions hosted or by stimulating network cooperation with other cities. This is obtained, however, without the possibility to precisely indicate the width of the interval (the size at which cities in each class reach maximum performance), and the speed with which the maximum size is achieved (the slope of the logistic curve of total net urban benefits).

To summarize, this approach highlights that there exists a *unique law of agglomeration economies that applies to all cities of any size and showing specificities within each size class. Within each city class, the quality of territorial capital assets—the presence of high-value functions or networking and cooperation capabilities—is the condition sine qua non to avoid decreasing returns.* From this perspective, smaller cities, especially, have high potential for growth if they enter a virtuous and cumulative path of transformation and innovation through the exploitation of high-quality territorial assets despite their limited size.

The macro-territorial approach, thus, not only explains the physical growth of cities, but it potentially explains their structural evolution. Indeed, innovation has for a long time shaped relative urban growth, mainly through the creation of new producer and consumer services, the increasing sophistication of existing services, the improvement of service functions within industries and their selective decentralization along the urban hierarchy, and the adoption of new technologies in internal mobility and communication (Andersson and Johansson 1984), thereby changing the nature of cities, their specialization patterns and their growth opportunities.

12.5 From Theory to Empirical Evidence: Research Questions and Model Specification

Sections 12.2–12.4 have summarized many theoretical explanations of agglomeration economies, while also suggesting some conceptual advances worth of empirical validation. Urban agglomeration economies are measurable, and a larger size is always linked to a higher urban productivity. What is less clear is whether agglomeration economies are characterized by increasing rates, as suggested by the NEG paradigm, or by decreasing ones, and whether they show a negative sign beyond some threshold, as suggested by the optimal city size theory. This aspect, which has important normative consequences, is subject to empirical validation in the following sections.

Another point suggested by the literature and shared in our empirical analyses is that agglomeration economies are not confined within the boundaries of a city, so that cities can 'borrow size' or 'borrow functions'. The role of population potential and of potential access to nearby functions as sources of productivity advantages is here differentiated. The two conditions are differently significant from a normative perspective: cities enjoying large population potentials because of locations close to pure residential areas require different urban strategies w.r.t. those enjoying the presence of nearby cities hosting high-level functions.

In a static framework, size is usually used as the main explanatory variable of urban efficiency, since it encompasses many elements usually correlated with size. However, some of these factors may also evolve irrespective of size, and become autonomous sources of productivity increases: in particular, functions hosted and the ability to establish long-distance city-networks.

Therefore, in the static framework, our research questions concern:

– whether larger cities are characterized by higher aggregate productivity, and whether this relationship takes place at increasing or decreasing rates;
– whether urban productivity is influenced by factors other than urban size, namely urban functions, 'borrowed size', 'borrowed functions', and urban network externalities;
– whether productivity advantages from high-level functions, 'borrowed size', 'borrowed functions' and city networks have different intensities in cities of different size.

In a dynamic framework, our research questions refer to validation of the conceptual macro-territorial model:

– whether urban productivity increases in time are related to urban size;
– whether productivity increases in time are related to the increase in the quality of functions hosted, to the increase of city networks, to the increase in 'borrowed size' or in 'borrowed functions';
– whether previous relationships hold differently for increasing city sizes.

In order to respond to these research questions, a specific model for each set of questions is tested. For cities c at time t, the static model has the following form:

$$urban\_productivity_{c,t} = \alpha + \beta_1 population_{c,t-1} + \beta_2 population^2_{c,t-1} + \varepsilon_{c,t} \quad (12.2)$$

where an indicator of urban productivity (*urban_productivity*) is regressed on *population* and its *square*. Equation (12.2) is the basis of our empirical analyses; its purpose is to test the empirical validity of the productivity-size relationship. $\varepsilon_{c,t}$ is an i.i.d. disturbance; in order to minimize endogeneity issues, all explanatory variables are time-lagged ($t > t-1$).

Equation (12.2) can be generalized in order to break down urban size into its constituents (Eq. 12.3):

$$
\begin{aligned}
urban\_productivity_{c,t} = {} & \alpha + \beta_1 population_{c,t-1} \\
& + \beta_2 population^2_{c,t-1} + \beta_3 urban\_functions_{c,t-1} + \\
& + \beta_4 borrowed\_size_{c,t-1} + \beta_5 borrowed\_functions_{c,t-1} + \\
& + \beta_6 network\_externalities_{c,t-1} + \varepsilon_{c,t}
\end{aligned}
$$

$$(12.3)$$

Equation (12.3) now includes the intensity of urban *functions*, *borrowed size*, and *borrowed functions*, while also controlling for urban *network externalities*. Empirical definitions of the variables will follow in Sect. 12.6.

Finally, in order to verify whether larger cities benefit more from each source of urban productivity, Eq. (12.3) is further extended to include interaction terms between urban productivity sources and city size.

The second set of research questions, which relates to the dynamic framework, is based on a formal model of the form:

$$
\begin{aligned}
\Delta urban\_productivity_{c,T-t} = \alpha &+ \beta_1 population_{c,t} + \beta_2 \Delta urban\_functions_{c,t-\vartheta} + \\
&+ \beta_3 \Delta borrowed\_size_{c,t-\vartheta} \\
&+ \beta_4 \Delta borrowed\_functions_{c,t-\vartheta} + \varepsilon_{c,t}
\end{aligned}
$$

(12.4)

Equation (12.4) links urban productivity increases over time to city size, to the growth of functions, and to an increase in externalities stemming from the entire urban system. The dependent variable is calculated between periods t and T, while subscript ϑ indicates a time lag, so that $\vartheta < t$.

Along the lines of the static model, Eq. (12.4) is also extended to include a measure of increases in the intensity of cooperation networks as a further determinant of achieving increasing returns:

$$
\begin{aligned}
\Delta urban\_productivity_{c,T-t} = \alpha &+ \beta_1 population_{c,t-\vartheta} \\
&+ \beta_2 \Delta urban\_functions_{c,t-\vartheta} + \beta_3 \Delta borrowed\_size_{c,t-\vartheta} + \\
&+ \beta_4 \Delta borrowed\_functions_{c,t-\vartheta} + \\
&+ \beta_5 \Delta network\_externalities_{c,t-\vartheta} + \varepsilon_{c,t}
\end{aligned}
$$

(12.5)

Equation (12.5) can also be extended to include interaction terms capturing whether explanatory variables have a different effect on dynamic productivity increases for cities of different size.

12.6   The Database and the Indicators

The models presented are estimated in the case of the urban system of the European Union. The units of analysis are EUROSTAT's LUZ (Large Urban Zones). Single indicators may refer to other spaces (central city, NUTS3) according to data availability.

Table 12.1 synthesizes the variables used in the empirical analyses. For static estimates, data are collected in panel form: the dependent variable is measured for the years 2004 and 2011, while the independent variables are time-lagged w.r.t. the dependent variable, and cover the 1998–2002 and 2002–2006 period averages. Dynamic estimates are based on a cross-sectional structure: the growth of the

Table 12.1 Indicators for the empirical analyses

Variable	Indicator	Source of raw data	Years available
Urban productivity	Urban house prices per square metre (in constant 2005 Euros)	EUROSTAT + National sources[a]	2004 and 2011
High-level urban functions	Share of high-level occupations over total workforce	Labour Force Survey	Average 1998–2002 and 2002–2006
Urban size	Population of the metropolitan area	EUROSTAT metropolitan areas data base	Average 1998–2002 and 2002–2006
Metropolitan location—critical mass (borrowed size)	Spatial lags of population in cities discounted by geographical distance	EUROSTAT metropolitan areas data base, Authors' elaborations	Average 1998–2002 and 2002–2006
Metropolitan location—access to nearby functions (borrowed functions)	Spatial lags of share of high-level occupations in cities discounted by geographical distance	Camagni et al. (2015a), Authors' elaborations	Average 1998–2002 and 2002–2006
Cooperation networks (network externalities)	High-level urban functions in other cities, discounted by the intensity of FP5 and FP6 collaborations between city couples	CORDIS	1998–2002 (FP5) 2002–2006 (FP6)

[a]National data sources include raw information from national statistical and research institutes. A full list of the sources used is available in Camagni et al. (2013), although the original data base has been updated with the inclusion of a wider set of cities and a longer time span

dependent variable is measured between 2004 and 2011, and regressed against 1998–2002 values of the growth of independent variables.[9]

Urban productivity is measured by urban land rent. Most empirical studies focus on average urban income levels; others, however, "*have used land values per capita as an index of net benefit*" (Richardson 1978, p. 324). This approach is also adopted in Albouy (2009), where a microfounded model of urban productivity premium is also empirically estimated on the basis of US census data. This work provides relevant evidence about the fact that "*wage and housing-cost data alone appear to be largely adequate for inferring local levels of productivity in tradables*" (Albouy 2009, p. 25). For these reasons, in this paper urban land rent is used as a measure of

---

[9]The only exception is related to the size effect, which is captured also in the case of the dynamic model in a single point in time. Conceptually, the models in Eqs. (12.4) and (12.5) report a *t* subscript; for the sake of the empirical analyses, this translates into regressing the growth of urban productivity between 2004 and 2011 against the average levels of population in 2004.

urban productivity,[10] with the aim of capturing not *gross*, but *net* location benefits, i.e. the difference between location benefits and costs. In fact, both mobile firms and households make their location choices on the basis of net benefits.

In particular, urban productivity is measured with average house prices per square metre in the centre of the core city of the LUZ.[11] Differences in house prices between large and small cities measure their relative attractiveness (and thus their net location advantage) as a result of an evaluation made by the market of the 'value' of these locations (Capello 2002).

This indicator may have some limitations related to the restrictions imposed by national or local jurisdictions on urban land expansion that bias urban land price variations according to supply restrictions rather than to demand increases. Conscious of this, and confident that urban rent remains the most valid measure for capturing net urban benefits, we control for these possible distortions by including in the model a dummy for the UK, the European country where land use regulation is applied most strictly (Cheshire and Sheppard 2002).

Indicators are needed to measure urban high-level functions, 'borrowed size' and 'borrowed functions', and 'city network externalities'. High-level functions are measured with the share of labour force employed in the ISCO 88 aggregate category 1, including "*legislators, senior officials and managers*".[12]

Following Camagni et al. (2015a), the 'borrowed size' of a city is calculated as the spatially-lagged population living in neighbouring cities discounted by distance, as in the following formula (Eq. 12.6):

$$borrowed\ size_c = \sum_{j=1}^{n} \frac{pop_j}{w_{geo_{c,j}}}, \forall c \neq j \tag{12.6}$$

---

[10]While the use of individual wages as an indicator of urban productivity is not feasible on the basis of the data set collected for this paper, we also believe the use of urban land rent could better capture the net advantages of an urban location, in line with an existing literature (Richardson 1971, 1972; Albouy 2009; De Groot et al. 2015).

[11]Urban rent is usually interpreted as the rent paid to the house owner. However, house prices represent the capitalized rent over time, and for this reason may be chosen as a proxy for urban rent. Land rent is measured here as the average prices of apartments located in the Central Business District of the cities analyzed.

[12]Empirically, the vectors of data have been calculated from the aggregation of micro data at NUTS2 level; the value of the NUTS2 region is assigned to the metro area located in the region. A full list of ISCO professions is available at http://laborsta.ilo.org/applv8/data/isco88e.html. The choice of these two professions as a measure of high-level urban functions is not an ad-hoc choice, but rather motivated by the definition given to occupations within the ISCO88 classification. Groups 1 and 2 are in fact classified in what is officially defined as "*Professional and managerial staff*" (EUROCADRES 2015). From group 3 onwards, occupations have a much lower skill content.

where c and j represent two different cities, w_{geo} is an nXn distance weight matrix formalizing the spatial interdependence between all cities,[13,14] and *pop* represents the vector of city populations.

The 'borrowed functions' of city c are instead calculated as the spatially-lagged functions of other cities, discounted by distance, as in the following formula (Eq. 12.7):

$$borrowed\ functions_c = \sum_{j=1}^{n} \frac{functions_j}{w_{geo_{c,j}}}, \forall c \neq j \qquad (12.7)$$

where w_{geo} is the same distance matrix as applied for the 'borrowed size' indicator.

Finally, city network externalities are measured according to the following formula for city c (Eq. 12.8):

$$city\ network\ externalities_c = \sum_{j=1}^{n} functions_j {}^* w_{coop_{c,j}}, \forall c \neq j \qquad (12.8)$$

where $functions_j$ is the ratio of workers in ISCO professions 1 and 2 in city j, while $w_{coop_{c,j}}$ is an entry weight in a matrix whose elements are the number of Framework Programme (henceforth, FP) projects in which institutions of cities c and j cooperate. This indicator makes it possible to measure functions of other cities that a city can access according to the degree of cooperation between the two cities, irrespective of the geographical distance between network nodes.[15]

12.7 Determinants of Static Agglomeration Economies

In this first empirical section, the results of the estimates of Eqs. (12.2) and (12.3) are presented. Table 12.2 shows the results of estimating Eq. (12.2) in column 1, Eq. (12.3) in column 6, while individual measures of agglomeration externalities are included one per column in columns 2–5. This allows a clearer picture of the individual contributions each of these measures provides to the emergence of agglomeration economies as captured by urban land rent.

The model in Eq. (12.3) is then extended with the inclusion of interaction terms between borrowed size and network externalities, on the one hand, and city size on the other (column 7). From column 8, controls for possible biases in these estimates

---

[13]The spatial connectivity definition adopted is based on simple geodesic distance between centroids.

[14]In order to verify at which spatial scale borrowed size exerts its effects, various attempts to adopt different weight matrices have been made. Results of this consistency checks are described in Sect. 12.7.

[15]See also Basile et al. (2012) and Camagni et al. (2015a) for a similar use of FP data to measure relational distance between regions and cities, respectively.

Table 12.2 Determinants of urban productivity

Dep. variable: urban productivity											
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Constant term	−9.70 (7.46)	−9.88 (7.53)	−10.04 (7.75)	−7.10 (7.75)	−8.56 (7.19)	−9.01 (7.17)	−8.10 (7.44)	−9.48 (7.43)	−11.70 (7.53)	−6.81 (7.56)	−6.68 (6.61)
City population	−2.22** (1.09)	−2.41** (1.11)	−2.25** (1.14)	−2.38** (1.04)	−2.05* (1.05)	−2.41** (1.04)	−2.30** (1.06)	−2.70** (1.14)	−2.51** (1.09)	−2.18** (1.08)	−1.90** (0.92)
Square city population	0.09** (0.04)	0.09** (0.04)	0.09** (0.04)	0.09** (0.04)	0.08**	0.09** (0.04)	0.09** (0.04)	0.10*** (0.04)	0.10** (0.04)	0.09** (0.04)	0.08** (0.03)
High level urban functions	–	0.35*** (0.03)	–	–	–	0.24*** (0.04)	0.24*** (0.04)	0.24*** (0.04)	0.24*** (0.04)	0.25*** (0.03)	0.25*** (0.04)
Borrowed size	–	–	0.23*** (0.07)	0.09 (0.07)	–	0.06 (0.07)	0.06 (0.07)	0.08 (0.07)	0.06 (0.07)	0.06 (0.07)	0.11 (0.09)
Borrowed functions	–	–	–	1.26*** (0.25)	–	0.99*** (0.24)	1.03*** (0.27)	1.03*** (0.27)	1.00*** (0.27)	1.04*** (0.26)	0.65** (0.30)
Network externalities	–	–	–	–	0.001*** (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001* (0.00)	0.001* (0.00)
High-level urban functions* City population	–	–	–	–	–	–	−0.01 (0.06)	–	–	–	–
Borrowed size * City population	–	–	–	–	–	–	–	0.16** (0.08)	–	–	–
Borrowed functions * City population	–	–	–	–	–	–	–	–	−0.26 (0.31)	–	–

(continued)

Table 12.2 (continued)

Dep. variable: urban productivity

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Network externalities * City population	–	–	–	–	–	–	–	–	–	-0.001** (0.00)	-0.001** (0.00)
Dummy UK	–	–	–	–	–	–	-0.07 (0.06)	-0.07 (0.06)	-0.07 (0.06)	-0.07 (0.06)	-0.01 (0.06)
Number of obs.	272	272	272	272	272	272	272	272	272	272	272
Robust standard errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Method of estimation	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Pooled OLS	Lewbel's IV
R^2	0.14	0.29	0.17	0.36	0.17	0.43	0.43	0.44	0.44	0.44	0.43
Joint F-test	32.46***	60.97***	23.21***	25.07***	24.83***	35.77***	29.06***	25.72***	28.29***	26.78***	30.57***

Note: Robust standard errors in brackets. Instrumented variables: Urban functions; borrowed size; borrowed functions; Network externalities. Underidentification test (Kleibergen-Paap rk LM statistic): 31.82***. Weak identification test (Kleibergen-Paap rk Wald F statistic) not reported (Stock-Yogo weak ID test critical values are not tabulated). Hansen J statistic (overidentification test of all instruments): 25.16***

due to land use restrictions in the UK case are also included (see Sect. 12.6 above), with the inclusion of a dummy for cities located in that country, which turned out not to be significant.

Across all specifications including interacted terms, multicollinearity may be a potential issue, particularly when continuous variables are interacted (Jaccard et al. 1990; Cortina 1993). In the estimates comprising interaction terms, this issue is tackled, as suggested in the relevant literature (e.g. Aiken and West 1991), by demeaning the interacted variables, thereby minimizing multicollinearity[16] without modifying all other estimated parameters.

Results shown in Table 12.2 consistently suggest that static productivity advantages are positively associated with urban size beyond a threshold, showing a U-shaped curve, with no maximum, as suggested by the micro-industrial approach. Large urban areas enjoy higher agglomeration advantages with respect to smaller urban settlements, underlining the importance of urban size for interaction opportunities and information exchange typical of Jacobsian urbanization externalities (Jacobs 1969). Moreover, the positive effects increase with size, showing no apparent threshold.

Positive and significant evidence is found for the role of high-level functions, irrespective of the specification of the model (Table 12.2). Following the theoretical expectations discussed above, functions shift the agglomeration economies curve upwards. This can be graphically represented as in Fig. 12.4, where average urban productivity (Y-axis) is plotted against urban size (X-axis) for different (minimum: continuous blue line; maximum: dashed red line) levels of high-level urban functions. When interacted with the size of the city (Table 12.2, column 7), the multiplicative term turned out to be insignificant, testifying that the positive effect of high value functions on urban productivity holds irrespective of the size of the city: both small and large cities benefit from increasing the high-value functions hosted, as suggested by the literature.

Table 12.2 provides evidence that 'borrowed functions' and 'borrowed size' play different roles in explaining urban productivity, so that it is wise to separate them out.[17] As far as 'borrowed functions' are concerned, in all specifications of the model they have a positive role in explaining urban productivity *per se*, while they lose interpretative power when multiplied by city size, testifying that the intensity of their effect is the same for both small and large cities (Table 12.2, column 5). Our expectations on the 'borrowed function' effect are confuted. Both large and small urban areas gain benefits from exploiting functions hosted in nearby cities, in line with the result for the functions hosted in a city.

A different result holds in the case of 'borrowed size'; the term *per se* has no significance, but when multiplied with the size of the city, it becomes positive, not

---

[16]In all such specifications, the Variance Inflation Factor thus obtained never exceeds a value of 1.2.

[17]Consistency checks have been produced on borrowed size measurement. An interesting result emerges: borrowed size becomes significant when the weight matrix is built with a 900 kms. cutoff, witnessing that a critical mass of population in neighbouring cities has to be achieved in order to play a role on urban productivity.
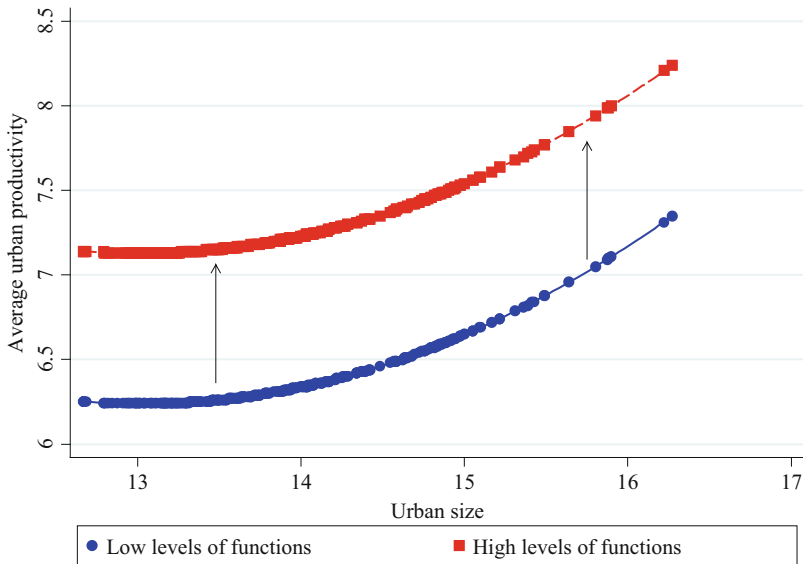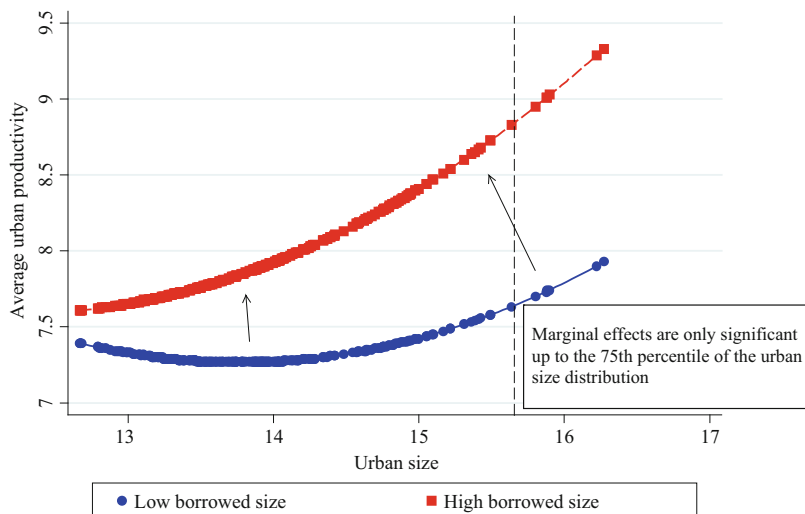
Fig. 12.4 Average urban productivity as urban size changes, for different levels of internal urban functions. Source: Authors' elaboration. Note: The two curves have been drawn by holding all parameters constant at their mean values, letting urban size, urban productivity, and internal urban functions vary. The continuous *line* with *circles* indicates the size-productivity relationship for the minimum value of functions in the sample analyzed; the *dashed line* with *squares* shows the same relationship for the maximum value of functions

for the average term (Table 12.2, column 8) but until the size of the city reaches a certain threshold. Market size effects are positive for cities larger than the average, and the intensity of the advantage is higher for larger cities (Table 12.4). Our expectations are confirmed: cities enhance their productivity by being located in large markets, the larger their size. This result is also represented in Fig. 12.5, where average urban productivity (Y-axis) is plotted against urban size (X-axis) for different levels of borrowed size.

Column 11 shows that the use of Lewbel's generated instruments allows to safely conclude that the sign and magnitude of the coefficients estimated for the main explanatory variables of the model in Eq. (12.3) are retained.[18] Positive and statistically significant evidence is found for the role of functions and borrowed functions as determinants of static agglomeration economies, while weak evidence of a positive role for network externalities (flattening as city size increases, as shown in Fig. 12.6) is also confirmed in this last regression.

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[18]The usual tests for the validity of the instruments have been performed. The underidentification test (Kleibergen-Paap rk LM statistic) is equal to 31.82, significant at all conventional levels; thus, the null hypothesis of instrument validity cannot be rejected. While the weak identification test (Kleibergen-Paap rk Wald F statistic) is not reported (Stock-Yogo weak ID test critical values are in fact not tabulated), Hansen's J statistic, which tests for the overidentification of all instruments, is rejected.
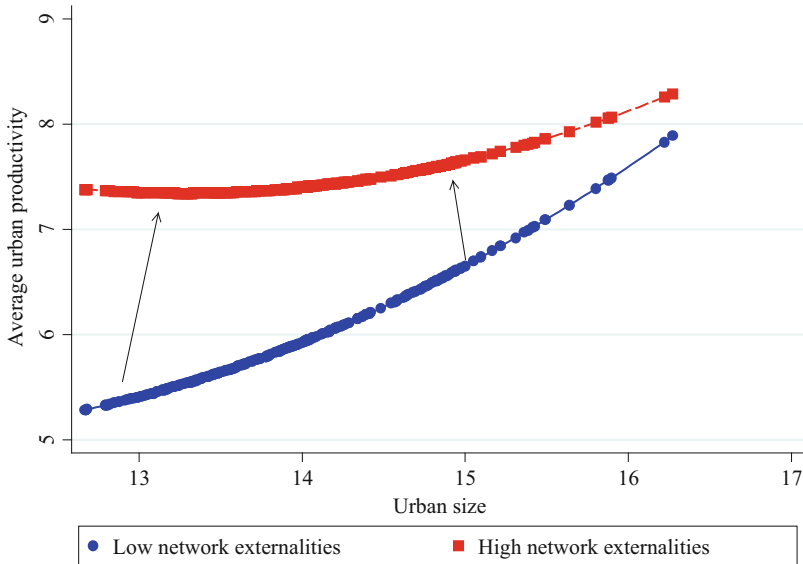
Fig. 12.5 Average urban productivity as urban size changes, for different levels of borrowed size. Source: Authors' elaboration. Note: The two curves have been drawn holding all parameters constant at their mean values, letting urban size, urban productivity, and borrowed size vary. The continuous *line* with *circles* indicates the size-productivity relationship for the minimum value of borrowed size in the sample analyzed; the *dashed line* with *squares* shows the same relationship for the maximum value of borrowed size

As regards urban network externalities, these are instead largely dependent on urban size (Table 12.2, column 10). The result shown in Table 12.2 suggests that, for an average size of the cities in the sample, network externalities play no role; however, this effect becomes significant for different city sizes. In order to see where this effect becomes significant, Fig. 12.6 plots average urban productivity (on the Y-axis) against urban size (X-axis) for different levels of urban networks externalities. Figure 12.6 shows that smaller cities benefit more than large ones from a more developed network of long-distance relationships, and this provides empirical validation for the city network theory, suggesting that cities can achieve agglomeration economies despite a limited urban size.

Clearly, all the determinants of static agglomeration economies could be structurally related to urban productivity advantages; in other words, the direction of causation could be reverse and the correct identification of the causal relationships in Table 12.2 would need additional research in order to be more clearly established. However, in the last column (11) of Table 12.2, an additional regression is shown, run onto the most general model (Eq. 12.3) on the basis of Lewbel's IV estimator (Lewbel 2012).[19]

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[19]This estimator is meant to "*identify structural parameters in regression models with endogenous or mismeasured regressors in the absence of traditional identifying information, such as external instruments or repeated measurements*" (Baum and Schaffer 2012, p. 8). Technically, in the

Fig. 12.6 Average urban productivity as urban size changes, for different levels of network externalities. Source: Authors' elaboration. Note: The two curves have been drawn holding all parameters constant at their mean values, letting urban size, urban productivity, and urban network externalities vary. The continuous *line* with *circles* indicates the size-productivity relationship for the minimum value of urban network externalities in the sample analyzed; the *dashed line* with *squares* shows the same relationship for the maximum value of urban network externalities

12.8 Determinants of Dynamic Agglomeration Economies

This section discusses the empirical estimates of Eqs. (12.4) and (12.5) in Table 12.3. This second set of estimates is devoted to identification of the determinants of dynamic agglomeration economies; it therefore links the time change of urban productivity (measured with changes over time in the price of average downtown apartments per square meter) to urban size, and to the increases in high-level urban functions, borrowed size, borrowed functions and city networks. Columns 1–3 differ by adding to the growth of borrowed size the increase in borrowed functions (column 2) and in urban networks (column 3). This makes it possible to isolate the possible correlations among these three variables. All other columns report the multiplicative effects one at the time.

---

absence of suitable instruments, this estimator constructs regressors that are not correlated with the product of heteroskedastic errors. Such instruments, while not being based on a quasi-natural experiment like traditional ones, satisfy at least the validity conditions that are statistically required to assess the arrow of causality in empirical estimates.

Table 12.3 Determinants of urban productivity increases

Dependent variable: urban productivity increases over time

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant term	−0.36 (0.51)	−0.53 (0.52)	−0.10 (0.06)	−0.04 (0.06)	−0.10* (0.06)	−0.10* (0.06)	−0.06 (0.05)	−0.14** (0.06)
City population	0.02 (0.03)	0.03 (0.03)	0.04 (0.03)	0.04 (0.03)	0.02 (0.03)	0.04 (0.04)	0.03 (0.04)	0.04 (0.04)
Growth of high-level urban functions	0.17*** (0.06)	0.15*** (0.06)	0.15** (0.06)	0.15** (0.07)	0.14*** (0.03)	0.15*** (0.05)	0.16*** (0.06)	0.16*** (0.06)
Growth of borrowed size	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.002 (0.001)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)
Growth of borrowed functions	–	0.43** (0.23)	0.46** (0.23)	0.49** (0.23)	0.45* (0.24)	0.46** (0.24)	0.43* (0.24)	0.45* (0.24)
Growth of networks	–	–	−0.31** (0.19)	−0.28 (0.19)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
Urban networks	–	–	–	0.19* (0.11)	–	–	–	–
Growth of high-level urban functions * City population	–	–	–	–	−0.15*** (0.05)	–	–	–
Growth of borrowed size * City population	–	–	–	–	–	0.003** (0.001)	–	–
Growth of borrowed functions * City population	–	–	–	–	–	–	−0.07 (0.31)	–
Growth of networks* City population	–	–	–	–	–	–	–	−0.00 (0.00)
Number of obs.	136	136	136	136	136	136	136	136

(continued)

Table 12.3 (continued)

Dependent variable: urban productivity increases over time

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Robust standard errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Method of estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Pseudo-R^2	0.09	0.12	0.14	0.16	0.15	0.15	0.12	0.12
Joint F-test test	3.01**	3.35***	3.09**	2.97***	14.50***	5.52***	2.46**	2.33**

Note: Robust standard errors in brackets. Lewbel's methodology yields insignificant parameter estimates, while the standard underidentification test cannot be rejected

Important results emerge from Table 12.3. The first of them is that urban size does not explain urban dynamics, which means that static productivity advantages associated with urban size do not play, *per se*, a role in urban growth patterns, as instead implicitly theorized in the shortcut reasoning of the micro-industrial and geographic approaches. Large as well as small cities all have the same opportunity to grow, and the explanations of their growth patterns reside in characteristics other than mere physical size.

A second important result is that increases in urban functions explain urban growth, whatever the specification of the model (Table 12.3). Stressed by the macro-territorial approach and by previous theoretical reflections present in the literature, like the SOUDY model (Camagni et al. 1986), this result has never before been tested empirically, and it has important normative consequences: cities of whatever size may increase their dynamics by undergoing structural changes of their functions, holding their size constant.

The effects of the increases in urban functions change according to the size of the city (Table 12.3, column 5). The results are reported in a continuum of urban sizes in Fig. 12.7, where urban productivity increases are plotted against urban size for different growth rates of high-level functions. This figure suggests that smaller cities benefit more than large ones from increasing their functions, but also that this relative advantage becomes less important for a more intense growth rate of functions.
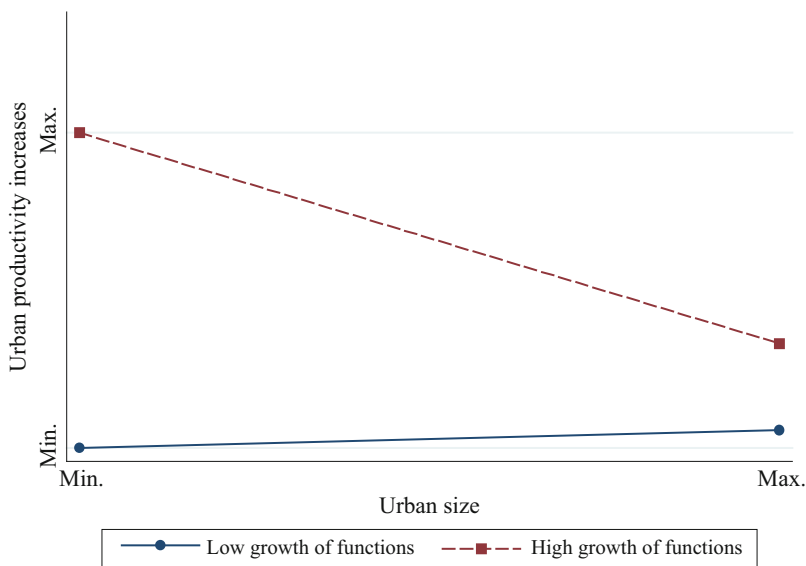
Fig. 12.7 Urban productivity increases and urban size for different intensities of the increase in high-level internal functions. Note: The two curves have been drawn holding all parameters constant at their mean values, letting urban size, the growth of urban productivity, and the growth of internal high-level functions vary. The continuous *line* with *circles* indicates the size-productivity growth relationship for the minimum value of internal high-level functions in the sample analyzed; the dashed line with squares shows the same relationship for the maximum value of internal high-level functions

Table 12.3 also provides strong and significant evidence for the identification of other levers of urban growth. In particular, a positive role is played by the increase of 'borrowed functions' in determining urban productivity increases, whatever the specification of the model (Table 12.3). This result adds much to what was just said about functions; not only is an increase in urban function a lever for urban growth, but the increase in the quality of the metropolitan system ('increase in borrowed functions') in which the city is located is a way towards better urban performance. However, once multiplied with urban size, the multiplicative term is not significant, testifying that both large and small cities grow thanks to an increase in the quality of the metropolitan system (Table 12.3, column 7).

Another possible lever is the increase in 'borrowed size'. When inserted on its own, 'the increase in borrowed size' shows positive estimated parameters and with associated p-values very close to the 0.1 threshold (Table 12.3, with the exception of column 6). When multiplied by city size, the parameter associated with 'increase in borrowed size' is on average not significant when the multiplicative term is added. However, as Table 12.4 in Appendix shows, the non-significance is linked to large city sizes. Therefore, the increase in 'borrowed size' has a significant effect on urban productivity (Table 12.3, column 6). While cities of smaller size benefit more from a small increase of the metropolitan area in which they are located, larger cities obtain lower advantages from 'borrowing size', as Fig. 12.8 shows.
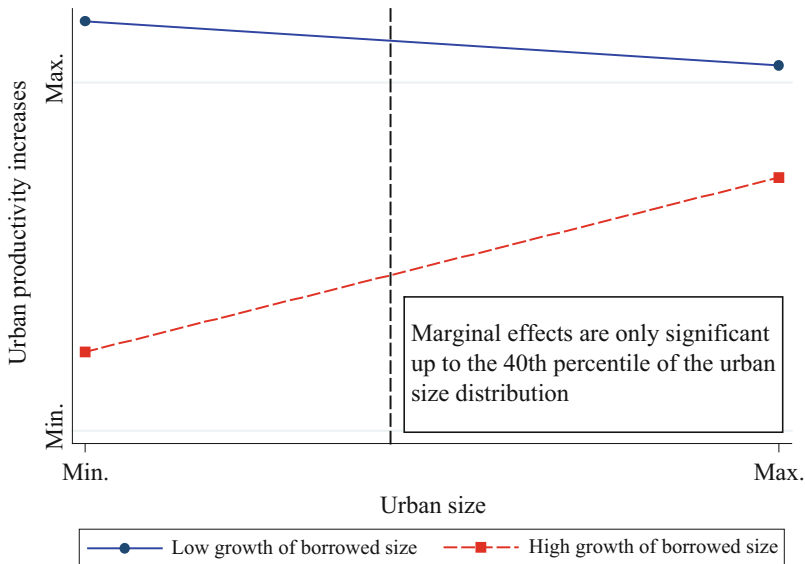
Fig. 12.8 Urban productivity increases and urban size for different intensities of the increase in borrowed functions. Note: The two curves have been drawn holding all parameters constant at their mean values, letting urban size, the growth of urban productivity, and the growth of borrowed size vary. The continuous *line* with *circles* indicates the size-productivity growth relationship for the minimum value of borrowed functions in the sample analyzed; the *dashed line* with *squares* shows the same relationship for the maximum value of borrowed functions

As was the case for the static results, the distinction between demand (market) and supply increases effects of surrounding areas is rather important: whilst supply increases effects hold for all cities, confuting our expectations that smaller cities would have benefited from a function-enhancement of nearby cities, demand increases effects are particularly effective for large cities, as we expected.

12.9 Conclusions

This paper has shed light on the role of agglomeration economies in explaining urban growth. It has underlined some questionable logical shortcuts present in the literature when a static (or comparative static) definition of agglomeration economies—i.e. the presence of higher productivity/efficiency in larger cities—is used to interpret growth and to directly expect higher growth in large cities. An 'equilibrium relationship' (Henderson 2010) and a static size-performance correlation are misinterpreted as a causal, dynamic relationship.

Three bridging links between a static and a truly dynamic approach have been suggested: the use of net benefits—instead of the gross ones typical of a microeconomic approach—as indicators of urban performance and potential drivers of growth (spatial attractiveness); the inclusion of other determinants of urban efficiency besides pure size, i.e. the presence and evolution of structural elements such as the quality of the hosted functions or the ability to establish city-networks; and the explicit introduction of the time dimension in both the theoretical and the empirical analysis.

An important theoretical distinction between static and dynamic agglomeration economies has therefore been applied throughout the paper. In the static framework, the paper has shown that, at least in Europe, agglomeration economies increase with city size, showing no sign of decreasing or negative returns. The empirical analysis was also able to validate the role of the functions hosted in the city, as well as the capacity of the city to cooperate with other cities, as suggested by Richardson (1978).

A further interesting result, again in regard to 'static' agglomeration effects, concerns the role of the spatial context in which the city is located and the possibility of 'borrowing' size-advantages from the population and the functions present in neighbouring cities—as the 'borrowed size' hypothesis supposes (Alonso 1973; Meijers 2013). In this case, a conceptual refinement has been proposed concerning the distinction between a pure 'borrowed size'—linked to the size of total population generating wide demand for goods and a pooled labour supply— and a 'borrowed function' effect—linked to the external presence of high-order functions generating a diversified supply of services and intermediate goods and a wide demand for labour. This distinction proved highly significant in the empirical analysis, with the expected positive effects on efficiency of the single cities.

Furthermore, the former element (borrowed size) produces different intensities of effects according to the size of the city: larger cities benefit more from a large market than small ones. On the other hand, supply-side effects related to the

presence of functions in nearby cities (borrowed functions) generate advantages for all cities, whatever their size.

In the dynamic framework, even more interesting results have emerged. For the first time to our knowledge, an increase in the presence of high-level functions has been identified as one of the main drivers of urban growth, and this proves true for both large and small cities. Moreover, the empirical results demonstrate that urban size *per se* does not explain urban growth: the crucial element in achieving growth is the ability to promote structural change, rather than reliance on a mere demographic size detached from any evolutionary interpretation. Furthermore, the upgrading over time of the quality of the entire metropolitan/regional system (measured through the increase in the share of high-level functions) has been identified as another important driver of the growth of the single cities belonging to that system, and again this holds for both large and small firms. The increase in the pure demographic size of the market in which the city is located has also been highlighted as an important growth-enhancing factor especially for large cities. Finally, the result concerning network externalities is rather peculiar: the message is that an increase of the network does not have any effect, whilst belonging to a wide cooperation network is able to enhance growth, even if at decreasing rates.

These results suggest interesting and innovative policy lessons. Productivity increases and growth may be generated not only by large and mega-cities but also by medium-size ones—solid, specialized, endowed with advanced functions and related human capital—and by mid-size regional urban systems characterized by high internal accessibility, complementarities through an appropriate division of labour, and large internal integration of the goods and labour markets.

A further consideration can be proposed. Even in a period of crisis like the present one, policy makers should concentrate their limited resources on those cities able to develop evolutionary and innovation-oriented strategies, to invest in renovated economic functions, and to build 'smart' cooperation networks (Camagni and Capello 2013) in the fields of applied research and innovation even with distant cities.

Appendix

Table 12.4 Significance levels (p-values) of the marginal effects for levels and growth of borrowed size

Urban size distribution	p-Values of the marginal effects	
	Borrowed size	Growth of borrowed size
25th percentile	0.000	0.489
50th percentile	0.000	0.031
75th percentile	0.000	0.000
100th percentile	0.722	0.001

Source: Authors' calculations

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Sustainable Urban Development: Definition and Reasons for a Research Programme

13

Roberto Camagni

13.1 Introduction

The concept of sustainable development is steadily achieving recognition, if not full disciplinary autonomy, becoming the focus of new theoretical and normative reflections. However, the same cannot be said of a more specific field of application of that same concept—the urban environment. In our opinion, this has been hindered until recently by some unresolved problems—of definition, methodology and epistemology—intrinsic in the more general concept, and also by some specificities of the urban case which have not been sufficiently borne in mind.

The research programme recently launched at the Politecnico di Milano[1] aims at directly facing these unsolved problems, and proposes a definition on which later empirical studies and new theoretical elaborations may be based.

As we shall see, from many viewpoints this is not so much a question of establishing new concepts, as of consistently exploiting existing ones or criticizing their improper use.

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13.2   The Specificity of the Urban Perspective

Facing the topic of sustainable development from the point of view of cities looks increasingly crucial. Cities in advanced countries now contain the greatest concentrations of economic and residential activities, and they are consequently the places where most emissions, waste materials and polluting materials are produced and where the highest share of energy is consumed. Moreover, if one of the most important elements in the production of all types of pollution is territorial density—since the capacities of the ecosystem to regenerate natural resources are relatively constant per territorial unit, while the negative impact probably grows exponentially—cities, with their very high density of land use, represent interesting cases.

A second reason for facing the problem of sustainable development by starting from cities concerns the efficiency of intervention. Cities have an important influence on global sustainability (e.g., through the effects of emissions of CO, CO_2 and NOx by traffic on the so-called 'greenhouse effect') but the same causes which endanger global sustainability also have their impact on 'local' sustainability, however defined (congestion, noise, air pollution) Breheny, 1992a. This being so, what has recently been presented as the 'locality theorem' (Camagni et al. 1996) indicates that it is much more efficient to face the problem by starting from a local level (in terms of both effects and of subjects and authorities) than from a global one, where authorities are often absent, polluting sources are remote, interdependencies between the actions of different subjects are higher, and uncertainties regarding measurement of phenomena and causal chains are more striking.[2]

However, although all the above indicates synergies and similarities between the global approach to sustainability and the urban approach, one fact must immediately be made clear: the latter has some strong specificities which mean that the methods and concepts used must be thoroughly revised. If reflection on "global" sustainability undoubtedly focuses on the dynamics of exploitation of natural non-renewable resources, it does not appear mechanically possible to transpose this reflection to the urban environment, as is very often done, since cities are by definition large manufacts, *artificial*—and no longer natural—environments created by man, perhaps his greatest creation.

The historical rise of cities itself by separation and autonomization from the surrounding countryside implies a clear-cut division between activities and professions—those which exploit natural resources and those which do not; the

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[2]The validity of the 'theorem' may be justified as follows. The more 'local' the problem (by nature, convention, or policy- maker's choice), the more:

- the identity between polluter and victim increases, and thus the willingness to pay in order to avoid damage;
- in the case of 'a few polluters', the principle 'polluter pays' is easy to apply;
- in the case of 'many polluters', the population is homogeneous, and goals and needs (including environmental ones) are shared to a greater extent.

emergence of social interactions enhanced by proximity, unthinkable in a model of sparse settlements; the development of activities linked to control, culture, art, and social and technological innovation; and the development of values of individual freedom as opposed to the 'ethical life' of peasant families (Camagni 1996b).

The existence of cities therefore already implies a fundamental choice: abandoning a model of life and social organization wholly based on integration between man and nature, in favour of one wholly based on integration between man and man; abandoning production functions based on the factors of land and labour in favour of functions based on overhead capital, information and energy.

There are very important methodological consequences here:

(1) a 'strong' definition of sustainability, implying non-substitutability between natural capital and artificial capital—a definition which is probably the most correct approach in a global perpective (Victor et al. 1994)—cannot be usefully exploited in an urban context, where natural capital (provided, for example, by greenfield land) is replaced by overhead capital;
(2) the close trade-off between economic development and environmental quality, explicitly or implicitly admitted in most discussions on global eco-biological equilibria, can and must be doubted in at least two cases, if we start to analyse cities:
    – cities in the underdeveloped world: in such cities, improved infrastructure and hygienic and cultural conditions linked to economic growth can only lead to improved environmental quality[3];
    – 'affluent' cities, where environmental quality may become a superior or luxury good and a critical location factor for advanced activities, and thus a precondition for further development.
    In both cases, the hypothesized trade-off is clearly an oversimplification of reality, valid for short-term analysis in which a *coeteris paribus* condition is acceptable for all socio-economic variables which generally accompany the historical evolution of society: technology, organization, social values and public policies. However, in the medium and long term, these variables are not constant (Beckerman 1993), particularly in an environment like that of cities, characterized by maximum interaction between those variables and maximum attitude towards change. We may thus think of the evolutionary trajectories of the relationship between environment and economic growth as long-term interpolations between short-term trade-off. These trajectories may show a positive or negative slope or—more realistically, if the above is true— they may vary according to the stages of social development (see the model we call VASE: Value-driven Alternative Sustainability Evolutions; Fig. 13.1).

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[3]Some environmental conditions, to achieve which man has long struggled and which still today are considered priority goals in less wealthy societies (e.g., availability of drinking-water and access to health services), are undoubtedly closely and positively connected with the level of development and, at least in the latter case, with the development of urbanization. See empirical evidence collected by the World Resources Institute, with a commentary by Beckerman (1993).

Fig. 13.1 The trade-off between per capita income and environmental quality: the VASE model. Source: Camagni (1996a)
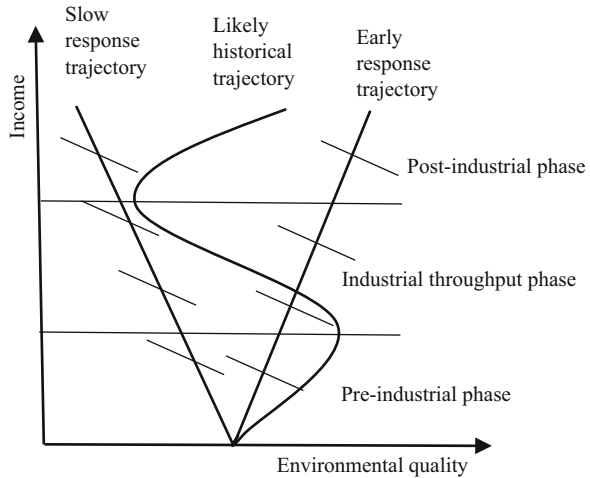
(3) The stronger the focus on local (and urban) aspects of the man/environment relations, the less these relations imply a long, multi-generation, time span in which to manifest themselves and the more it seems justified to refer their effects (also) to the interests of *present* generations rather than (only) of future ones. This allows us to overcome the thorny logical and methodological problems (including problems of moral philosophy) which inevitably present themselves when the interests of future generations are considered[4] and to use the most traditional instruments of analysis of public choices and rational behaviour;

(4) lastly, an approach often followed by some environmentalists who view sustainability as linked to autarchy and respect for the carrying capacity of the local area (with no possibility of trading those capacities in the form of transfers of natural resources or waste from one area to another), appears to be unrealistic in an urban context: cities are by definition poles in the spatial division of labour, nodes of international exchange of immaterial goods, with high contents of intelligence against material goods, with high contents of natural resources, instruments for freeing human activities from the constraints of local resources (why should only Arabs and Texans be able to use cars in cities?).

Not to consider this contradiction explicitly means one of two things: trivializing the approach to urban sustainability by not recognizing its specificity, or squeezing ourselves inside a restrictive theoretical framework, according to which all cities are by definition 'unsustainable'.

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[4]See Pasek (1993) for a clever summing up of these problems. I have the impression that reference to future generations often provides a good scientific and political alibi aiming at reducing rather than increasing concern and interest in environmental problems.

In other words, it must not be cities as such to be questioned[5], as some highly relevant new trends which jeopardize their primary role as points of social interaction, creativity and (relative) collective wellbeing. I refer here to the processes of desordered and limitless growth which cities often undergo during periods of economic take-off and rapid industrialization: or to the recent processes of sprawl, variously labelled as 'metropolisation', 'suburbanization', 'città diffusa', 'ville éclatée', 'edge-city development' (Camagni 1994). These processes have made the conceptual distinction between city and countryside empirically ambiguous, leading us towards a non-city and a non-countryside; processes which have above all exacerbated the problem of mobility and energy consumption because they result in a settlement model wholly dependent on the private car. But I also refer to the new processes of 'ghetto development' which are increasing in large cities, due partly to global social transformations and partly to the difficulty (and delay) with which public policies have dealt with the problem.

In conclusion, research on urban sustainability must have as its model of reference not an earthly paradise of eco-biological equilibria, but rather an (albeit simplified) multidimensional archtype, in which the various functions of cities are recognizable: supply of agglomeration and proximity economies, accessibility and social interaction, network linkages with the outside world, in which a maximum of collective wellbeing emerges from positive processual integration among natural environment, built and cultural heritage, economy—and thus employment—and society.

13.3 Which Definition of Sustainable Development?

As is widely known, the concept of sustainable development aims at launching a large-scale political, economic and cultural project harmoniously linking environmental requirements with those of economic development, from a long-term viewpoint. The interests of future generations are therefore explicitly set next to those of present generations, and the processes of economic optimization are constrained by the respect of the limited reproduction capability of the biosphere.

The Bruntland Report of the World Commission on Environment and Development "Our common future" (WCED 1987, p. 9) defined sustainable development as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional changes are made consistent with future as well as present needs".

It is no longer worth commenting on some of the criticisms or doubts raised about the program of sustainable development, for example about its presumed ambiguity, its imprecision, its paternalism inherent in the appeal to the needs of

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[5]The city has variously been defined as: 'a parasite on the natural and domesticated environments, since it makes no food, cleans no air, and cleans very little water'; a 'cancer' and, as such, a 'lethal illness'; an 'overgrown monstrosity, with gluttonous appetites for material goods and fast declining carrying capacity'. See Haughton and Hunter (1994, chapter I) for a short list and balanced criticism.

future generations when, it is stated, current development is insufficient to resolve the needs of many present generations.

Rather, I would like to stress one element of the definition, because it is often lost in the analysis: the emphasis placed on 'process' and change, rather than on a static objective of optimization of some kind. We are dealing here with the idea of achieving a process of collective learning in which the maximum of synergy between economy, technology and environment is reached and negative cross-externalities among the same three subsystems are minimized. However, as soon as one wishes to proceed from general definitions to more directly operational specifications and thus to better identification of the aims and constraints of the problem, the different proposed definitions become infinitely multiplied and appear as a long sequence of infinitesimal variations on a theme.

Without wishing to go into a detailed analysis, because that is not the aim of the present paper, I have tried here to give a simple classification of these proposals, since greater clarity and some theoretical both seem essential if we are to proceed further.

The first, quite evident, dimension through which to classify the various definitions and which implies a preliminary dichotomy, is that between input-oriented—i.e. non-renewable resources oriented—definitions of production and exchange processes, and output-oriented definitions of those same processes, i.e., linked to the level of wellbeing, utility, income or per capita consumption. We therefore have on one hand definitions based on the need to place restrictions on the use of certain resources in the process of economic development: i.e., not to exceed their regeneration capacity (e.g., fish, forests) or their capability of assimilation of polluting substances—or, in the case of non-renewable resources, of guaranteeing their most efficient use. On the other hand, we have definitions based on the need to guarantee a continual flow of long-term wellbeing, with the implicit awareness that a high level of such wellbeing cannot be reached by destroying natural resources and contaminating the biosphere (Fig. 13.2).

A 'weak' conceptualization of sustainability is generally implicit in the second approach, in the sense that it allows more or less ample substitution between various elements of the utility function or the production function (with the replacement of artificial for natural capital, purified water instead of natural water). Instead, an idea of 'strong' sustainability is generally implicit in the first approach: that is, no reduction in the availability of a non-renewable resource can be compensated by the increased availability of another one.

The second dimension through which we have classified the different definitions—the second dichotomy—may be found in the type of underlying rationality. On one hand, we have proposals based on what has been called 'substantive' rationality, definable according to Herbert Simon (1972) as rationality which presupposes the possibility of behaviours which are always appropriate for the achievement of particular goals in the presence of definite constraints: the decision-maker does not commmit errors, either ex ante or ex post, at least not systematically. This is a rationality subtended mainly to neoclassical economics, implying the availability of perfect information, perfect knowledge of constraints and outcomes of decisions, and unlimited computational capacity. On the other
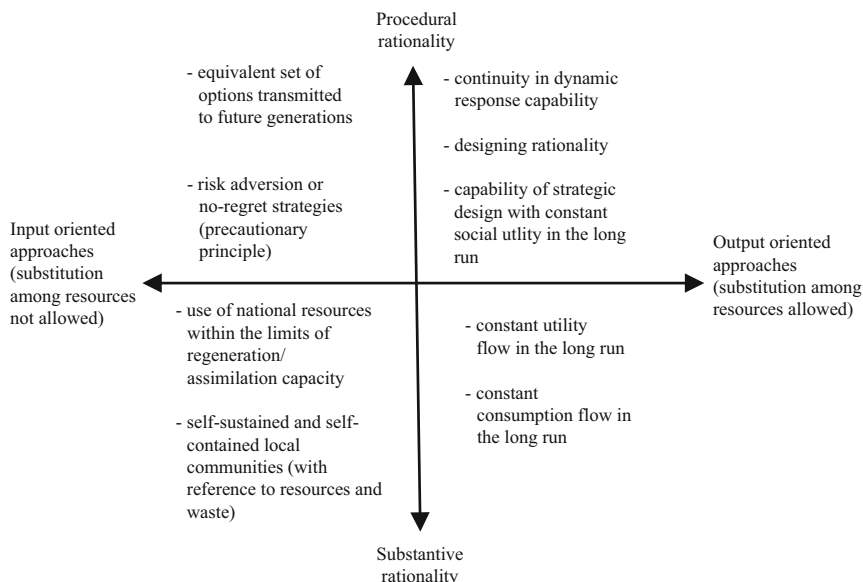
Fig. 13.2 Alternative approaches to sustainable development

hand, we have proposals based on another type of rationality, elaborated initially in social psychology, based on the analysis of more realistic cognitive processes in situations characterized by imperfect information, uncertainty and complexity: 'procedural' rationality, defined not so much according to the ends-means-decisions consistency as on the correctness of reasoning and of a process of information collection and processing. The evident uncertainty lurking behind every economic choice—in the quantity and appropriateness of information, the availability of a strong causal link in predicting effects, the possibility of complex or chaotic outcomes due to non-linearity of relations, or the difficulty of governing choices and other people's reactions—has led social scientists (and social actors) to become increasingly interested not so much in identifying optimal choices as in ways of identifying them by means of the construction of conditional scenarios, planning, consensus construction, and minimum-risk decision-making.

Inside substantive rationality (Fig. 13.2, bottom) are the definitions of sustainability of Solow (1986) and Pezzey (1989), both based on observations of output and open to substitutability among factors, which identify it in a non-decreasing level of per capita consumption or utility in time (bottom, right)[6]. But proposals of the opposite sign may also be included, all aiming at establishing

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[6]Solow indicates the conditions necessary for such optimal allocation of resources in an intertemporal sense, and in particular the so-called Hartwick condition: that rents produced as a result of the exploitation of natural non-renewable resources (natural capital) should be invested in reproducible activities capable of replacing those resources.

constraints on the exploitation of resources. Pearce (1988) identifies sustainability as the exploitation of natural resources which does not exceed their regeneration capacity, or as the rate of polluting emissions which does not exceed the rate of assimilation of the ecosystem in question.[7] Then there are the various ecologistic proposals for creating local self-sustained and self-contained collectivities, in which resources are exploited within the limits of their local capacity (Magnaghi 1990). In all these cases (bottom-left in Fig. 13.2), there is no uncertainty regarding the measurement of the phenomena or the outcomes of actions, and no analysis of the social costs of drastically restrictive measures (or on the distribution of such costs).

On the other hand, proposals which fully account for uncertainty, for risks deriving from the irreversibility of many choices in the environmental field and of the possibilities of strategic learning by actors during the development process, belong to the framework of procedural rationality. Of those oriented towards control of inputs (top-left side), we find the significant works of:

- Pearce et al. (1989), who suggest strategies of a safe minimum standard of conservation and of risk aversion;
- Vercelli (1994), who proposes a strategy of conservation of natural resources with the aim of leaving open the largest number of options to future generations, while waiting for a learning process which would progressively illuminate the real relations between economic development and the evolution of the bio-sphere. In this case, sustainable development would allow us to leave future generations a set of options at least equal to those we have now—options which could have value in that they might in the future allow changes in strategy as and when new information made such changes necessary;
- Froger (1993) and Faucheux and Froger (1995), who propose a combination of the two previous approaches, in the form of a decisional procedure which, following Simon, introduces intermediate sub-goals (in time), tangible and capable of being measured and evaluated, to replace global, intergenerational, abstract goals. This procedure aims at the avoidance of irreversible processes when exploiting resources (the precautionary principle) and guarantees an 'initial' state which is transmitted to the next generation allowing the maximum number of alternative options.[8]

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[7]It is interesting to note how Pearce's concept of sustainable development has evolved over the years towards the former view based on output. In Blueprint 3, devoted to measurement of sustainable development, Pearce states that 'sustainable development is economic development that lasts' and that 'it is continuously rising, or at least non declining, consumption per capita, or GNP, or whatever the agreed indicator of development is' (Pearce 1993, pp. 7–8).

[8]Properly examined, this seems to be the most revealing interpretation of the definition of sustainability contained in the Bruntland Report, which speaks of development 'to meet the needs and aspirations of the present without compromising the ability to meet those of the future' (WCED 1987, p. 40), rather than the 'substantive' interpretation of 'intergenerational equity' which implies precise prediction of the needs, values, preferences and technologies of future

Very similar, but based on the capacity to find solutions rather than on the need to keep open resource-exploiting options, are proposals (top-right side in Fig. 13.2) which view sustainability as:

– a continual capability of change and response (Camagni et al. 1998);
– a capability of creative adaptation, of 'designing rationality' (Vercelli 1994);
– a continuous capability of strategic design guaranteeing at least a constant flow of long-term collective utility.[9]

Clearly, the proposals shown on the left of Fig. 13.2 are more stringent and probably more consistent from the viewpoint of the conservation of resources, since they directly control their exploitation. However, in view of the use these definitions have in an urban context, we prefer the proposals on the right of Fig. 13.2, since we see in the good overall functioning of a city a superior goal with respect to the conservation of some specific resources located in the territory of that city. Within the latter proposals, we prefer those in the upper quadrant, which reflect attention on processes rather than directly on results, on collective learning rather than on predefined goals.

A different dimension and therefore a possible new dichotomy through which to classify definitions and approaches to sustainability may be the often stressed distinction between approaches based on market economic behaviours and approaches implying a clean break with existing institutional organization and reference to a new ethic. On one hand, we find those who believe that "the proper use of environmental resources is more a matter of economics than morals" (Dorfman and Dorfman 1972, Introduction) and, on the other, those who believe that ethical values must guide the actions of people and of governments in directions which respect the environment.

I have not used this type of interpretation and classification, because I believe it is erroneous and leads to useless dichotomies. If we wish to anchor ourselves to an operative approach and thus avoid palyngenetic analyses and proposals which risk making a myth out of the environment or 'the territory', neglecting existing society and above all failing to indicate actors and forces for possible radical change; if we also carefully analyse the ways in which the market can or cannot achieve certain goals imposed politically or ethically by society, then we must conclude that there is only one possible pathway—that of a market oriented by a shared ethic.

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generations. The idea of defining short-term subgoals referring to the passage between the current and the next generation is the 'temporal' counterpart of the strategy of definition of a limited 'spatial' horizon in which to define sustainability, described above as the 'locality theorem' (see note 1). Both cases imply problems of uncertainty and imperfect information from the standpoint of procedural rationality, attentive to the achievement of at least 'satisfactory' goals.

[9]By 'capability of strategic design', we mean not only the capability of constructing long-term strategies but above all that for implementing them by means of participatory planning, based on negotiation and persuasion, as indicated by the recent experience of strategic planning applied by public planning agencies. Cf. Gibelli (1996).

This is not a question of inventing new definitions of 'markets' or economic mechanisms, but of accepting what, after Karl Polanyi, is no longer a debated point.[10] The market is a social formation: it operates and works within a series of rules, criteria, definitions, and values defined by society and human beings. According to Polanyi (1944), "a market economy can only function in a market society"—a society which in particular defines the rules of some 'particular' markets, in which factors, not goods, are exchanged. Polanyi indicates three markets: labour, land and money. We would like to add a fourth: that of non-renewable environmental resources. These 'particular' markets can only operate inside clearly visible social and institutional rules explicitly defined by national collectivities. In the same way that, over the centuries, society has applied to itself increasingly more stringent rules for the labour market, today society is dictating rules for the exploitation of natural resources, in parallel with growing perception of the value of those resources. In this sense, we agree with René Passet (1994) when he observes that "l'éthique frappe à la porte de l'économie".[11]

Ethics must allow two types of corrections to market functioning, through state action: in internalizing externalities and in considering the long term (or the interests of future generations), two well-known cases of market 'failure'.

The difficulty is both analytical and political. But an attempt may be made to resolve the problem on the political sphere by the voluntary action of 'good actors' in a 'good simulated market' in which we can morally take care of our long-term future. In the case of non-renewable environmental resources, we must discount the future at relatively low interest rates, lower than those currently in force on the market. Excessively low rates would mean considering all future generations as equal to existing ones, thus limiting consumption to a subsistence level for these latter; social discount rates too near to current private ones would imply rapid exhaustion of resources.

So we must create a 'good market' (Veca 1993) which, environmentally speaking, transmits a far larger number of signals than the short-sighted market of individual ethics but which in any case avoids extensive public regulatory intervention which will inevitably come into conflict with the equally costly risk of 'government failure'—due to insufficiency of information, non-selectivity of

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[10]'The exceptional discovery of recent historical and anthropological researches is that man's economy is generally immersed in his social relations' (Polanyi 1944).

[11]Another problem not faced here is that of deciding wheher new behaviour respecting the environment may derive from the standpoint of traditional moral philosophy, which we could call anthropocentric, or whether 'for a sustainable society ... different systems of preferences, values and use of scientific knowledge ... will be necessary' (Bresso 1993, p. 25), i.e., a new ecocentric ethic. Although it seems right to state, as many have done (e.g., Norton 1984; Turner 1988) that the framework of traditional reflection on ethics must be extended, I agree with Heister and Schneider (1993) that, if 'environmental ethics is a question of deeper insight into humanity's own place in the universe, of more human self-respect and, derived from that, of more respect for all creation, ... then, however, environmental ethics is anthropocentric', and there is no need to claim, explicitly or implicitly, any special rights of nature for itself, requiring special behaviour by man.

regulatory instruments, difficulty in applying and checking regulations, arbitrary distribution of intervention costs.

13.4   Sustainable Urban Development

Various kinds of definitions and approaches also show up when we apply the sustainability model to cities. In this case, instead of classifying them, we prefer to review some of their contents and directly make some choices, sometimes of method, sometimes of simple subjective preference.

Level of Analysis: Local, Transborder, Global
The sustainability of urban development is proper to all three levels of environmental problems. Our proposal, completely subjective, is analysis of local effects: sustainability must be evaluated in terms of its effects on local collectivities, in the awareness that a city launched on a 'locally' sustainable path is one which actively participates in reducing global negative effects.

Goals
The priority variable must be the long-term wellbeing of the local population, linked to the prosperity of the city as such. In abstract, a city is a great economic, social and cultural value, subjected to the continual risk of being annihilated by a series of negative feed-backs due to its spontaneous development and by prevailing short-term signals and decisions. The wellbeing of the population includes not only needs connected with economic and material wellbeing, but also ones connected with cultural and professional growth, identity and sense of belonging, access to the environmental and cultural values of the city.

Environmental Resources in the City
Today, these represent one of the most powerful instrumental variables for city development and wellbeing. However, they have often been considered as the sole goals of the sustainable city and treated alternatively in a purely abstract or sectoral way. In particular:

– theorizing territorial autarchy, in which human activities are limited by the availability of local physical and environmental resources (White and Whitney 1992) does not appear to be acceptable: any city and any model of social division of labour and complementarity between city and countryside would be judged as non-sustainable;[12]

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[12]It is not by chance that these authors also believe that the pre-modern city is not perfectly sustainable ('quasi- sustainable'), on the basis of its need to provide itself with water and food, sometimes from distant regions. Even Plato identified in colonialism an intrinsic characteristic of the city, obliged to 'go to war' every time its population exceeded a certain threshold and tertiary activities prevailed over agricultural ones (see Camagni 1996b, p. 6). Today, relations between

– the concept of carrying capacity, understood as "the maximum population that can be supported indefinitely in a given habitat without permanently impairing the productivity of the ecosystem upon which that population is dependent" (Rees 1988, p. 285; White and Whitney 1992, p. 9) is an essential concept, although it must be used with greater caution than is generally the case. This is because its measurement depends on the size of the supporting territory, which is chosen subjectively and which changes according to the problems involved. It also depends on available technologies, scale economies in treating waste and wastewater, and type of activities carried on in the city;[13]

– lastly, we must remember that urban environmental resources are often artificial and therefore expandable at a certain cost (e.g., urban biomasses).

Thus, a sustainability program based on the non-exchange of carrying capacities between territories does not seem to be a valid proposal, if by this physical exchange of resources (or of waste products) more efficient territorial processes are achieved.[14]

We thus come finally to a definition of the sustainability of urban development. In our opinion, we can define sustainable urban development as a process of synergetic integration and co-evolution among the great subsystems making up a city (economic, social, physical and environmental), which guarantees the local population a non-decreasing level of wellbeing in the long term, without compromising the possibilities of development of surrounding areas and contributing by this towards reducing the harmful effects of development on the biosphere.

Let us consider the single elements of this definition in turn.

It is *a process,* nourished by collective learning and by capacities for the resolution of conflicts and for strategic design, not the application of an optimal model defined once and for all.

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city and non-city are manifested in less violent forms of commercial relations with advantages to all parties.

[13]To state, as Rees (1992) and Alberti (1994, p. 23) do, that if the world population were capable of living within the limitations imposed by regional capacities, the net result would be global sustainability, appears to be a completely subjective view, in two senses: first, the consumption of land surface required by such a model would be extremely high, given the reduced density it would impose on settlements; second, it is not a question of 'not being capable' of living in a diffuse way but of the fact that such a model does not appear to be the most efficient one, from the viewpoints of productivity and interaction between people—otherwise, the world would already be a different place.

[14]It does not seem relevant to include among the arguments of sustainabiliy the absence of unequal exchange, in terms of value, among various territories, as it is proposed by White and Whitney: it is true that the terms of trade which penalize the countries of the South result in a waste of natural resources, but this problem, from the theoretical viewpoint, is not very different from the problem of the right pricing of scarce resources, and is a different and greater problem, from the political viewpoint, than that of the sustainability of local development.

The various systems making up the city (economic, social, physical—built and cultural heritage—and environmental) must be considered together and in their dynamic interactions (externalities, feedback, increasing returns, synergies). We cannot just put different aspects together and expect them to add up to a proper sum. We must take up an evolutionary approach characterized by full consideration of the complexity involved, with its components of non-linearity, cumulativity and irreversibility.

Operatively, sustainable urban development is pursued by maximizing the area of integration between the various subsystems and by minimizing the effects of idiosyncrasies and negative cross-externalities among them (Fig. 13.3). For example, the high population density of a city should represent an opportunity for achieving scale economies in transport, reducing per-capita energy consumption for heating, allowing advanced forms of district heating, in public illumination, etc. The city allows to maximize access to a differentiated labour market, to education and health structures, and to occasions for social interaction. Again, thanks to the high density of land-use, it can (potentially) guarantee good access to a wide range of values embodied in its historical, cultural and environmental heritage. On the other hand, the cases of air and water pollution depending on the same high density
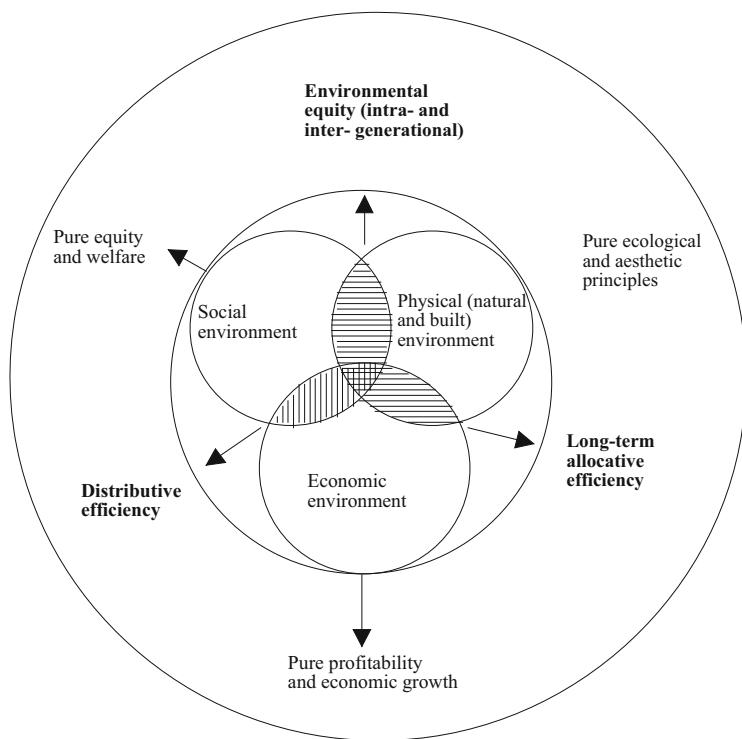
Fig. 13.3 The locus of sustainability principles and policies. Source: Camagmi 1996a; Camagni et al. 1996

of land-use and cases of depletion of the historical heritage due to growth requirements (or to neglect caused by lack of growth of local income) stand as witnesses to the existence of negative externalities which must be controlled and minimized.

Integration between the regulatory principles of the various subsystems is required in order to achieve the preceding goal. Private efficiency, social equity, aesthetic quality and ecological equilibrium are valid principles and policy goals in each single sphere, but they are partial and antithetical and do not lead to sustainability. On the contrary, we must aim (Fig. 13.3) at:

– *a long-term allocative efficiency* by internalizing social costs and constructing a 'good market' which can properly deal with environmental externalities and assess future benefits and not only immediate ones;
– *distributive efficiency*, by allowing the maximum number of inhabitants to exploit and enjoy the services, benefits of agglomeration and variety of available options offered by the city. This does not mean constructing the city of equality, which is a condition neither necessary nor sufficient for sustainability, nor a city without conflicts. On the contrary, the city must play host to diversity, must defend, integrate and reproduce it, must guarantee non-discrimination, permeability and vertical mobility for its population, turnover of élites, and maximum access to opportunities. The sustainable city is not a conflict-free city but one which knows how to manage its conflicts;
– *environmental equity*, in both inter- and intra-generational senses. Once again, this means not so much, and not only, producing environmental values, but guaranteeing access and enjoying them to the entire population, both present and future. The element of equity refers to the environmental element in two main senses. One: many environmental policies may be costly and imply greater sacrifices for the less wealthy classes (e.g., a carbon tax or a private car tax weighs more heavily on them, since the share of their income destined for mobility is greater). Two: as many environmental goods are typically located on physical space, some potential users may be excluded from enjoying them.

The new regulatory principles we propose here are therefore less ample than the pure principles, but they are more selective and above all potentially compatible. The concept of equity emerging from this framework, understood both in the sense of access to environmental goods and of equal opportunities for the population, gives a long-term guarantee of greater potential development for the city and thus does not contrast with the concept of long-term efficiency. The same may be said of policies more directly oriented towards the environment which, although they imply short-term costs, provide long-term locational advantages and thus further possibilities of development.

There are three contexts in which the problem of urban sustainability arises and may be faced in a normative sense:

– technology;
– territory and urban form;
– life-styles and organization of social work.

In these three cases, we can distinguish between short-term and long-term goals and policy interventions. In the short term, the path towards sustainability implies to intervene on demand, the overall supply conditions remaining constant by definition; therefore it implies input substitution and energy saving in the production process (the overall structure of that process being equal), and changes in mobility models (locations, residential and productive, being equal). On the other hand, in the long term, interventions may involve technologies and urban form, profoundly changing the ways in which the city and its activities function. As we can see, the characteristics of technologies and those of the territory and how it is exploited mirror each other faithfully (Table 13.1).

A major difference between the two cases is worth underlining: while in the case of technologies the same elements that push towards energy saving in the short run (e.g., a rise in energy prices) at the same time address research and investment towards clean and environment-friendly technologies in the long run, as decision agents are the same, viz. the individual private firm, the same cannot be said about settlement patterns. In this latter case in fact:

– long-run evolutions of urban form depend heavily on public decisions and regulations, and are not just on individuals' choices;
– private decisions about residential locations are heavily intermediated by the real estate and construction industries, whose decisions about supply location only marginally depend on sustainability considerations;
– total private costs of individual mobility represent only one factor in residential location decisions, and only a huge rise in these costs could determine a visible reversal of the residential dispersion trend;

Table 13.1 Objectives and tools of sustainability policies

	Short term	Long term
Technology	Input substitution: – Incentives for energy-saving – Energy tax – Tradeable emission rights	Technological change: – Incentives to R&D for renewable technologies – Regulations on polluting technologies
Land use	Changes in mobility patterns: – Road pricing, parking pricing – Car pooling – Traffic calming – Incentives to intermodality	Changes in urban form: – Polycentric city – Transport / land-use integration – Incentives for environmental values in periurban areas
Life styles and habits	Reduction of polluting habits: – Incentives to bicycle use – Attractiveness of public transport – Incentives to recycling and selected disposal of solid waste	Ecological lifestyles: – Teleworking, teleshopping – Flexible working time – Renewable technologies for heating

– social costs of mobility on private cars are higher than private costs, but they do
   not alter private decisions unless they are internalized through a public decision.

All this explains why long-term considerations about urban form are often
overlooked and even contrasted in current theoretical debate and common planning
practice (Rydin 1997).

More complicated is the third context of habits of the population and of organi-
zational models, since public intervention must, for obvious reasons, be exerted
more indirectly and delicately. We cannot generically condamn Western life-styles,
with their individualism, competition and consumerism, as 'simply not sustain-
able'.[15] What is essential is a system of prices and taxation which discourages
products with ascertained negative environmental impact. In this case too, we can
distinguish between the short term, in which we must restrict the use of transport
means and goods with a strong environmental impact and the long term, in which
civic and organizational culture proposes or imposes new models of living, working
and moving about (tele-work, except for some antisocial aspects which have
restricted its use until now; recourse to neighbourhood services; revitalization of
city districts with the aim of creating a 'city effect' and a new sense of solidarity);

Given the characteristics of immobility and long duration of the urban physical
capital, the problems of irreversibility and the cumulative effects of decision-
making on urban growth must be carefully considered. Policies for sustainable
cities are ones which require high capability for predicting synergy and feedback
effects, high capability of anticipating spontaneous processes, and use of a precau-
tionary principle. As for the temporal dimension of phenomena, we can say that,
more than is the case of the natural environment, cause-effect and interaction
relationships among the three subsystems occur quite rapidly, and we can easily
assume as our planning horizon a time span compatible with the persistence of the
current generation.

13.5 Sustainable Urban Development and Urban Form: Structural Analysis

This research programme aims at analysing the links between the morphological,
structural and functional aspects of cities and the sustainability of their develop-
ment. Attention will therefore be paid to a set of elements pertaining to the form and
functioning of urban territory.

The territorial characteristics which we believe have an impact on long-term
urban performance are, in decreasing order (of generality and aggregation):

(1) the absolute dimension of the city: economies and diseconomies of agglomera-
    tion and various phenomena of dynamic efficiency are linked to the absolute

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[15]See the otherwise excellent article by Blowers (1993), p. 7.

dimension of a city, in the same way that, on the purely environmental level, the perception of congestion phenomena are connected to the absolute dimension (OECD 1995). Two recent econometric investigations about the relevance of size in determining both economic and environmental efficiency of cities in Northern Italy confirm an U-shaped relationship as far as costs are concerned ('overload effect'), and an inverse U-shaped relationship as far as urban benefits are concerned ('city effect'), with optimal size respectively indicated in 50,000 inhabitants and 300,000 inhabitants (Capello 1996; Camagni and Capello 1997);[16]

(2) land-use density which, coeteris paribus, reduces the energy required for heating (size being equal, a single-family house consumes about three times as much energy as an apartment: Owens 1992, p. 82), for lighting (it is instructive to recall that the metropolitan area of Milan, which embraces 44% of the population of Lombardy, only consumes 33% of the energy for public lighting, 38% for domestic use, and 31.8% of the total amount of electric energy required for all purposes), and for transport (in densely populated cities, the percentage of use of public transport for personal movement is higher, and bicycles are used more (OECD 1995; Newman and Kenworthy 1989). Clearly, in densely populated cities, availability of and access to parks and green areas is reduced, so that we are faced with a problematical trade-off here;

(3) city form: its compactness, the configuration of its peripheral areas and its parks and green areas. Although these elements are difficult to measure, they nevertheless become elements central to wellbeing, urban efficiency and sustainability. They have recently been the focus of a passionate debate, mainly following publication of the EC's Green Paper on the Urban Environment (EEC 1990) which clearly indicated compact urban forms as the most favourable. Apart from some controversial statements (like that of Breheny 1992b, who speaks of 'obsession')[17], and referring to 'compactness' in a sensible fashion, it would not be an exaggeration to state that ample consensus has been reached on the fact that strategies of 'concentrated decentralization' like those long implemented by Danish and Dutch planning, which result in various forms of polycentrism and reinforcement of the 'urban effect', with their large areas of

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[16]These relationships hold in a condition of coeteris paribus; a translog production function reveals us that these thresholds may substantially increase, enlarging the "optimal" city size, when cities show an increasing share of advanced tertiary functions and increasing network linkages with external territories.

[17]Refusing density and urban compaction as generators of energy savings in private mobility and substituting them by increased fuel prices and public transport availability on the basis of an econometric analysis (as in Breheny et al. 1997) does not apparently lead to sound results: the latter variables in fact mainly impinge on per-capita energy consumption through residential location choices and consequently through urban density and form. In practice, all the mentioned policy tools—namely density regulations, transportation investments and energy prices—have to be utilized together by planners.

public parks and gardens (like the English 'green belts' or 'fingers' flanking more heavily urbanized areas of German and Scandinavian planning) do represent an efficient territorial meta-model of reference.[18]

The comprehensive survey by OECD (1995) and a recent Report on European Cities (Camagni 1997) show that successful 'best practice' policies, to be preferentially extended to other cities, involve:

- revitalization of city centres (to the point of 'retrofitting' centrality and urban effect where previously no centre existed, as in Reston, Virginia, a suburb of Washington, D.C.);
- policies for polynuclear reorganization and for creation of 'urban villages' (like in the Finnish planning experience);
- policies of urban 'containment', already tested twenty years ago in the United Kingdom and now extensively re-applied, especially in America (see recent plans for Vancouver, British Columbia; Ontario, Canada; Davis, California; and Portland, Oregon);
- attempts to implement integrated transport/land use planning by locating huge mobility-generating activities at the major nodes of the public trasportation networks (the policy 'the right business at the right place' of Dutch planning), possibly in a central location (Portland, Stockholm, Toronto, Vienna, Copenhagen);
- and the increasing resistance to the opening of suburban hypermarkets which is currently felt in France, Holland, the United Kingdom, and now also America;

(4) mixing of land-uses. One of the elements generating maximum expansion of the demand for mobility is the functional specialization of various areas of cities, connected to the historical practice of zoning. Integrated territorial structures are now becoming more popular (possibly hosting activities vertically integrated along production filières: see Camagni and Gibelli 1992), in which most of the demand for mobility is self-contained. However, the problem is extremely complicated and subject to long-term trends which in any case lead towards expanded mobility flows. Labour market catchment areas are extending, as a result of the fragmentation of functions and professionalization; even 'life basins', for reasons of amusement and leisure time, culture or work, are widening; the increasing women participation rates and the increasing number of family units in which two people both have jobs also breed this trend. Only for low-quality jobs is it possible to think in terms of local labour market basins. For all these reasons, many town planners do not see many alternatives to the old model of monocentric cities or high-density working locations, served by efficient public transport in the direction of satellite residential areas (Lacaze 1993; Camagni 1994).

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[18]Breheny proposes a 'multipli-city', a polycentric model in which non-excessive regional density accompanies an important urban effect: see Breheny and Rookwood (1993).

All previous elements and relationships have to be assessed in a dynamic perspective. In fact, the overall urban system is in a state of evolution and, as already mentioned, the public decision-making process must be constructed as a dynamic process, of learning and dynamic interaction.

The urban system moves on the basis of (and thanks to) phenomena of feedback, synergy, cumulativity, network externality, increasing returns and indivisibility, i.e., non-linearities which generate all kinds of possible outcomes—explosive development, sudden catastrophic leaps, chaos—and above all irreversibility. The case of the choice of a private transport mode, cumulatively reinforced by residential location choices generating a dispersed and sprawling settlement pattern are typical in this respect. Non-coordinated individual choices, often taken under a prisonner's dilemma condition, do not necessarily lead to collective wellbeing and do not allow corrections as far as they imply non-reversible use of land resources.

13.6   Some Preliminary Conclusions

This paper aims at supplying an initial theoretical and methodological framework for a long-term innovative research program, highlighting the specificity of the problem of sustainable development when applied to an urban environment.

A city is by nature a manufact, an almost entirely artificial object, constructed by man for historical goals of socialization, synergy, increase of knowledge and social wellbeing. A 'weak' concept of sustainability, which permits ample substitutability between production inputs and utility function inputs, is almost impossible to avoid. When considering the problem in its entirety, we must combine the socio-cultural, economic and environmental elements which all go towards the construction of that complex set of relations we call a city.

Of course, this does not mean that we must simply add up different aspects, different goals and different principles of analysis and intervention (principles of equity, efficiency and environmental equilibrium), as is often done. We believe we must revise these traditional principles, elaborating three new ones: the principles of long-term allocative efficiency (integrating economic and physical environments), distributive efficiency (integrating economic and social environments), and environmental equity (integrating social and physical environments, and aiming at maximizing access to environmental values in intra- and inter-generational senses).

Another characteristic of our approach is that of assuming fully a dynamic viewpoint, consistent with the intrinsically dynamic and interactive nature of phenomena connected with the sustainability of development. This implies:

– consideration of dynamic interactions among the above three environments—in the form of positive and negative feedback and effects of synergy or idiosyncrasy;

– full consideration of uncertainty as an essential background element, in turn requiring an approach to problems based no longer on substantive but on procedural rationality (in Simon's sense);

– consideration of the intrinsic uncertainty in cause-effect relations pertaining to sustainability and of the degree of effectiveness of intervention policies indicates a partly subjective and partly objective choice for our research program. This choice is to limit analysis, in spatial terms, mainly to the local scale (hypothesizing that the global level too gains from any improvement in lower-level conditions) and, in temporal terms, to a long period which embraces mainly the current generation (in the conviction that feedback effects important for the urban environment abundantly manifest themselves over a thirty-year period). This choice limits the interpretative uncertainty of territorial processes, increases the normative efficacy of interventions, and avoids the problem—economically and philosophically intriguing—of how future generations are to be represented around the table of present decisions.

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Urban Development and Control on Urban Land Rents

14

Roberto Camagni

14.1 Introduction

The city and the overall urban system perform two essential roles closely connected with each other: first, they ensure territorial efficiency for economic activities by furnishing public goods and externalities, thereby supporting the competitiveness of such activities; second, they ensure collective well-being for the communities within them by furnishing urban quality and services. It is evident that economic success finances quality, and that such quality proves attractive to external activities and populations, thus boosting growth and development. Moreover, when territorial efficiency is understood in modern and advanced terms as resource-efficiency—primarily efficiency in the use of land, natural resources and energy, but also of human capital—territorial efficiency policies simultaneously pursue objectives of sustainability and innovation/competitiveness.[1]

But the two objectives of efficiency and urban quality, as well as that of strengthening territorial identity, entail public investments in infrastructure, modernization, maintenance and management. These are costly investments that must be made with continuity, and, in the case of many countries strongly hit by the

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[1]Even in the USA Richard Florida has recently authoritatively proposed to President Obama the creation of a Federal Department of Cities, with the mission of "catalyzing and accelerating intelligent urban reforms" and reorienting in a more rational way federal expenditure on infrastructure, environment, job creation and training towards settlement densification and new development driven by knowledge and creativity (New York Daily News, 2 February 2013).

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crisis, reactivated. There is a widespread impression in Italy that for the past 20 years there has been severe underinvestment in cities (Calafati 2009), an underinvestment which has worsened in the last decade, well before the blowing up of the crisis (Cogno and Piazza 2013). Since 2004 and up to 2012 capital account expenditure by local administrations (from regional to municipal) as a share of GDP decreased by 34%, while that by larger municipalities alone fell, in absolute terms, by 63% (Camagni 2014).

Today the main problem to be addressed is that of finding the necessary financial resources at a time of profound crisis of public, national and local finances. The argument that I put forward in this paper is that this is possible to a large extent through a rebalancing of the surplus values of urban transformation between the public and private sectors in favour of the public one, which has been heavily penalized in numerous European countries, not only those of South Europe, and in many developing countries. Cities—the large and medium-large ones with their international projection and their resources of knowledge and creativity, and those of smaller size with their cultural, relational and environmental resources—assured, at least until the onset of the 2008 global crisis, the high, if not extremely high, remunerativity of urban transformation processes in the form of rents, capital gains and profits for potential entrepreneurs developers. A more balanced distribution of these value surpluses is not only possible but also highly desirable. This redistribution is a concern for territorial research in many countries, as well as a number of large international agencies and important research centres.

This paper addresses five interlinked theoretical and practical issues. In Sect. 14.2, the taxation issue of land rents coming from urban transformation is presented, leading to a win-win situation: it allows to finance new infrastructure and public goods which cumulatively relaunch public well-being, competitiveness and consequently profits and urban rents. Section 14.3 deals with the problem of financing cities, illustrating different fiscal exactions that are widely utilized in advanced and emerging countries and which imply a burden on land rent. Sections 14.4 and 14.5 present the legal and economic justifications for a taxation of rents deriving from urban development and transformation and Sect. 14.6 a tentative comparative assessment of the relevance and incidence of land rent taxation in some European countries.

14.2 Cities, Land Rent and Taxation

A city is a great collective good created through investments and decisions both public and private. It produces collective advantages—externalities of various kinds that enhance the well-being of citizens and the efficiency of production activities. As a consequence, the economic value of a city's individual parts—places or urban spaces—is not determined by individual action, but by collective action external to the individual actor: that is, it is due to the cross-synergies and cross-externalities that come about among places thanks to proximity, the existence of infrastructures and the presence of a wide variety of activities. The classical economists maintained, in fact, that urban land values depend on the "overall development of society".

These land and property values therefore are the counterpart of real advantages that can be obtained from locating new economic or residential activities within the city: advantages of accessibility, internally to the urban area but also externally to it, and those deriving from the agglomeration of numerous complementary activities. These advantages and these consequent values have always existed, whatever the land ownership regime. Hence, their monetary counterpart, land rent, has always existed as well. To a large extent, it derives from efficacious, efficient and far-sighted urban planning. But, as the classical economists (and also a great neoclassical one like Alfred Marshall) taught, rent can and must be adequately taxed.

A large part of these land values, i.e. land and property rents, derives from the presence of public goods: roads, parks, stations, airports, mobility and communication networks, and services—which enhance public welfare and economic efficiency—all of which requiring public (national, regional or local) investments and current account expenditure (management and maintenance costs). And the presence of these public goods is deeply linked to the construction of a shared, collective project for the city.

We therefore observe a sort of large-scale cumulative virtuous circle: a compact core of urban activities organized around a network of externally connected infrastructures generates increasing returns to urban scale that attract new activities. The efficiency and competitiveness of this urban core yields incomes (profits, salaries) and property rents whose taxation furnishes the resources needed for new public goods, new infrastructures and new services which relaunch the growth process (Fig. 14.1).
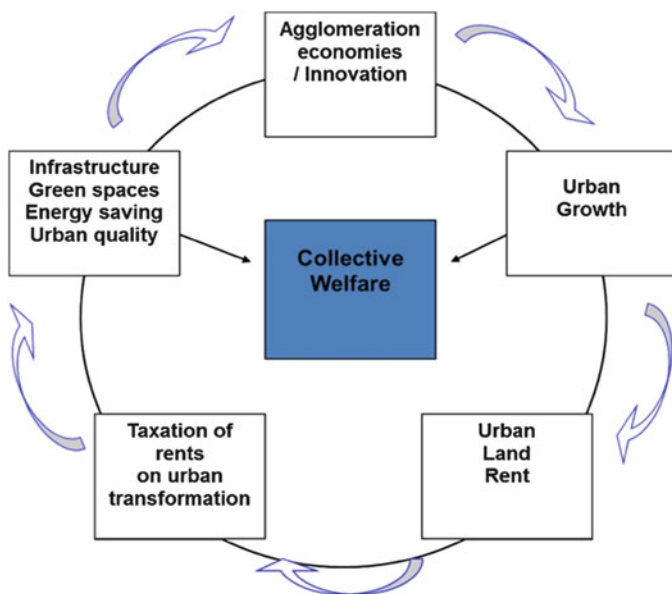
Fig. 14.1 A virtuous cycle: land rents taxation and reinvestment

From the point of view of financing, the provision of urban public goods has always been undertaken by the national government and local administrations. But the fiscal crisis of the state (and of local authorities) has created numerous difficulties (Huxley 2009) due to the increased costs of fixed investments, the new demand for advanced structures and services driven by globalization, and by the weight of the public debt incurred in the years of the crisis (and, in many countries like Italy, in previous years of irresponsible public finance).

Necessary today is not only the radical rationalization of overall public expenditure but also, and especially, the creation of sources of financing for new urban infrastructures, above all by introducing or reinventing forms of fair division between public and private of the value surpluses generated by the transformation of cities (Healey et al. 1995; Camagni 2012a, Chap. 6; UN-HABITAT 2013, pp. 134–137; Calavita 2014 Camagni et al., 2014). This programme is in part technical, but it is above all political, in that it is targeted on a different distribution of income among social classes and a different allocation between consumption and investment of the value surpluses generated by the city (Ingram and Hong 2012). This is not a matter of increasing the weight of general taxation, which is often already high, but rather of hitting an economic sector—that of real estate—which in many countries, and particularly those of Southern Europe and large part of the developing countries, is a sort of fiscal paradise.

In the Italian case, international comparative analyses suggest that there is ample room for a substantial increase in the proportion of surplus value that can remain in the hands of the public partner. This can be achieved through increases in local planning obligations, which today often do not cover even the costs of the infrastructures directly serving new constructions and/or through extra obligations to be arranged with the private partner during negotiations on important transformation projects.

The new urban planning tools—negotiation between public and private actors, transferable development rights—indubitably make it possible to deal with many problems that the previous regulatory planning tradition failed to resolve. But by themselves they are certainly not able to acquire new resources. In fact, full realization of fiscal objectives depends on their implementation, on the political will in their regard, and on the determination to pursue public interests while ensuring a fair level of profitability for entrepreneurial initiative and rewards for private innovative capacity and strategic design. None of these are elements intrinsic to the new urban planning tools.

The objectives of planning equity and efficacy must be verified in practice through substantial innovations in administrative transparency and in the accountability of administrations to the community.

In the less advanced and developing countries, the recommendations of agencies and large international studies centres increasingly concentrate on differentiated forms and practices of "value recapture"—i.e. recovery for the community of value

surpluses directly created by public action or investment—and of "value sharing"—
i.e. a fair division between public and private of value surpluses in urban transfor-
mation (from agricultural uses to residential and productive uses of land), through
national and local rules, and agreements negotiated between administrations and
real estate operators (UN-HABITAT 2013, Chap. 12; Smolka 2013; Walters
2013).[2] Countries like Colombia (Bogotà), Brazil (Sao Paulo, Rio) and India have
introduced national legislation on land value sharing. But they also obtain large
public revenues by taxing the value increases of areas due to improvements in
accessibility. Large-scale urban infrastructural projects have been at least partially
financed in this way.

14.3 The Costs of the City: How Are They Financed and Paid for?

As shown above, the city entails huge public costs: for urban investment in
infrastructure, social overhead capital, public and green spaces; for urban mainte-
nance (often overlooked); for the running of urban services.

How are these costs financed and paid for? The tools are numerous, and
traditionally they referred to public intervention, generally by central governments
and partly by local ones. Increasingly, especially after the repeated periods of crisis
of financial and fiscal budgets of states and public administrations that began in the
1970s, the role of the private sector is seen as crucial.

We can list the following tools, in increasing order of financial and fiscal
participation by the private sphere:

a. central government anticipations on future taxation resources, and transfers to
   local administrations;
b. local loans and bonds (. . . in ages of growth);
c. user fees for service provision;
d. project financing by private bodies, against concession to build and run the
   services on the new infrastructure;
e. assigning development rights to private developers in order to finance land
   acquisition for public uses (as in the Italian "*perequazione*") or to achieve other
   public advantages: the Dutch "space for space" instrument where additional
   dwellings finance the demolition of stables in open areas (Janssen-Jansen et al.
   2008, Chaps. 1 and 2), or the US Transferable DR addressed to the conservation

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[2]See the extremely clear *Recommendation D3b* of the Vancouver Declaration: "The unearned
increment resulting from the rise in land values resulting from change in use of land, from public
investment or decision, or due to general growth of the community must be subject to appropriate
recapture by public bodies (the community), unless the situation calls for other additional
measures such as new patterns of ownership, the general acquisition of land by public bodies"
(UN-HABITAT 1976).

    of green spaces or historic landmarks (Johnson and Madison 1997; Renard 2007; Janssen-Jansen et al. 2008, Chap. 7);

f. different forms of "land readjustment", implying acquisition of land by the local public administration within a wide project area, to be subsequently partly swapped for land physically necessary for the infrastructure project (rails, roads, parks, etc.) and partly sold on the real estate market to cofinance the main infrastructure. In a sense, the public administration internalizes the main value increases generated by the new infrastructure, utilizing them for partial financing of the public project. Interesting cases have been recently implemented in Japan (Chorus 2008);

g. local property taxation;

h. local exactions on building activity, for the coverage of infrastructure, green spaces and services directly linked to the development projects: *taxe d'amé nagement* in France, *oneri di urbanizzazione* in Italy, *cargas de urbanizaciòn* in Spain and similar tools in almost all Western countries;

i. local taxation on private estate development implying betterments or windfalls: planning gains (partly negotiable) on granting of a development permit in UK, increasingly covering infrastructure and services only indirectly linked to the estate project; impact fees (non negotiable) in the USA (Evans 2004, Chap. 8);

j. value recapture through taxation of "betterments" or "windfalls" generated by public investments (Hagman and Misczynski 1978). Three main methods are utilized (OECD 1998; Camagni 1999):

   – "internalization of externalities", when a public or private "super-developer" is attributed the simultaneous task of building the infrastructure and some related commercial or residential buildings, generating the surplus with which to finance the operation. This method has yielded good results in Japan and, at the end of the 1990s, in Hong Kong with the construction of the rail link to the airport, supported by developments around five stations along the line;

   – taxation of property owners for the "betterment" generated by public infrastructure, a tradition followed by the British Labour governments after the Second World War (Healey et al. 1995; Evans 2004) and by other countries like Germany, Switzerland, Italy (but only for a short time in the 1960s with the "contributi di miglioria"—betterment contributions), and the USA—especially on the basis of the establishment of Special Assessment Districts and referenda among citizens. The at least partial agreement of the people involved by taxation seems crucial in limiting risks of lawsuits, which in this case could imply high costs and long delays, due to the fact that capital gains and value increases are only virtual and not realized on the market;

   – taxation of developers: this case comes close to previous case i, engaged in a more generalized recapture of betterments, generated not by public investments but by public zoning and land use ordinance;

k. different forms of taxation on transformation benefits and "value sharing" between the private and the public spheres, whose terms are mainly defined through legislation (national: Spain) or through planning negotiations (UK,

Germany, France, partly Italy); in the USA, the quite new practice of "public benefit zoning" implying community benefits—plan-based or negotiated— against an increase in density, or an "up-zoning", on specific sites (Calavita 2014; Calavita and Wolfe 2014);

l. national taxation on capital gains emerging from urban transformation (shift from agricultural to building uses; acquisition of a development permit) (Evans 2004, Chap. 8).

As is sufficiently clear, cases a to c imply the sole financial responsibility of the public sector. Cases d to f imply the use of the market and of market tools in order to minimize the financial burden on the public sector; but they do not involve any form of taxation of the private sector. Cases h to l imply growing taxation on transformation surplus values accrued by the private sector. The intensity of such taxation is differentiated among national and local systems and depends closely on differentiated political, cultural and legal attitudes towards private ownership of land and towards equity and income distribution issues.

Exactions on development permits were for a long time the primary means to provide infrastructure associated with new development in almost all advanced and developing countries; in UK, the US and other European countries local governments moved over the years from exactions linked to local benefit to those of general benefit, giving rise to multiple litigations but consolidating the practice (Hagman and Misczynski 1978). More recently, with the advent of planning negotiations in many countries (Healey et al. 1995; Walters 2013), these practices did multiply, establishing actually an agreement on the justification of forms of (more or less incisive) value sharing and (partial) rent recapture.

14.4 The Legal Justifications for Value Recapture

Taxation of the rents and surplus values arising from urban development and transformation is crucial at times of fiscal crisis of the state. It may depend on ethical and income redistribution imperatives, but it must be rationally and convincingly justified on the grounds of:

a. legal principles;
b. economic principles.

Let us begin with the first issue, the legal principles that can support decisions to partially recapture into public hands a part of the surplus values originating from urban transformations and from public land use ordinance and restrictions. Of course, all this has to do with the conception and treatment of property rights and in particular with the content of legal rights on land.

In the common law tradition, land ownership is first of all a relational concept concerning the multiple relationships between the owner of land and other subjects claiming a stake on it (Krueckeberg 1995). Consequently, land ownership consists

in a "bundle of rights", which are multiple and separable. Furthermore, following the theorization of the great American jurist W.N. Hohfeld, the content of ownership refers to rights but also to "privileges, powers, immunities and duties", the claim on future developments on land being identified as a privilege of ownership, not a right (Booth 2008, p. 214). The British legal system established with the Town and Country Planning Act 1947 removed the right to land development from the bundle of ownership rights, stating that the entitlement to development should come from a permission granted by the state or the local authority.[3] No space is left for any right to compensation for the owner as a consequence to this limitation.

In more recent times, development permits are assigned through complex planning agreements implying the possibility for the administration to recover "planning gains" in kind rather than only in cash, through the direct provision of extra benefits for the area by the private party—infrastructure, facilities, public spaces, affordable housing. Only a part of these benefits is the necessary physical precondition for the functionality of the estate developments (roads, sewage systems), but the bulk of them may be seen as a sharing, indirect in nature, of the surplus value of land transformation between the private and the public parties, amounting in some cases to 8% of the value of buildings (Department for Communities and Local Governments 2006; Marmolejo 2010).

Some commentators have questioned the indirect way in which betterments are taxed, through a planning agreement between the administration and the specific developers: a direct taxation of betterments and a strict earmarking of the revenues for special purposes would be at the same time more efficient, more equitable in the sense of transparency and fair treatment of all developers (Spaans et al. 2008) and more justifiable in terms of the necessary relation between the amount of the obligation and the planning purposes and goals (Healey et al. 1995).

This is the way indicated by the new Spanish Constitution, art. 47, and the strategy followed by many Spanish cities, like Barcelona, which in general prefer a legal but transparent and generalized obligation to a case-by-case solution through public–private negotiation: "*La comunidad participarà en las plusvalias que genere la acciòn urbanistica de los entes publicos*"—the community and the local public administration will participate in the surplus values generated by the planning action of public bodies. The subsequent Land Act (*Ley del Suelo*) 2007 defines the value of the obligation, paid through a transfer of land to the municipality, between 5% and 15% of the value of the building permit calculated as the difference between the market value of the output and the construction plus pure land costs (Camagni 2012b).[4]

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[3]Booth (2008, p. 216) sees here a "vestigial remnant of feudalism", something that is totally absent in the American common law tradition, where ownership rights are believed to be absolute and directly related to freedom.

[4]Catalunia Region opted for a 10% rate, Pays Vasco (Bilbao) for a 15%. These land transfers add to the normal transfers for roads and other facilities and to money obligations for infrastructure provision.

Another legal justification concerning the recapture of betterments concerns a slightly different issue. Betterments and worsenments (in the British vocabulary) or windfalls and wipeouts (in the American one) understood as increases or decreases in the value of land do not depend on landowners' actions but on community actions: by government or by other private parties investing or more generally operating in the city (Hagman and Misczynski 1978). Furthermore, no property owner has a right to a favourable zoning ordinance, the rationale regarding the well-being of the entire urban community: thus, zoning should be considered a community property right (Fischel 1985; Spaans et al. 2008), and the right of personal use of property should be viewed as different from the right to profit from property (Krueckeberg 1995).

Many Latin American Constitutions include a similar principle for equity and income distribution reasons: no citizen should accumulate wealth that does not result from his own effort—*no enriquecimiento sin justa causa*, "no unjustified enrichment with no cause" (Smolka 2013, p. 8).

In the American tradition, recapture of surplus values has never been explicitly accepted, but a different rationale is given for some form of taxation of real estate development: impact fees imposed on the developer to recover the public costs for the provision of public goods and infrastructure directly linked to the development scheme ("recoupment") and as a counterpart to the spatial and environmental impacts of the scheme itself—on traffic, on demand for local public services. Since the 1970s this tool has been introduced by many US states as an alternative to an increase in property taxation.

This justification comes close to a traditional claim of planning, namely the need to provide or reconstruct public goods—natural, seminatural or built—endangered by physical expansion of settlements: a sustainability justification which adds to an equity justification. In fact, it seems rather bizarre if a municipality used general taxpayers' money to provide infrastructure and services necessary for the livability, and profitability, of newly built and specific neighbourhoods.

A last case encompasses those legislations that, although they accept that betterments should accrue to individual owners, provide tools for their more equitable distribution among owners in similar conditions but differently treated by planning ordinance or goals. The logic of "windfalls for wipeouts" responds to this issue by using part of windfalls to compensate wipeouts borne by other owners; the already-mentioned Dutch system of "space for space" imposes a direct or indirect compensation by developers to the owners of improved agricultural land; the Italian "*perequazione*" point-to-point within wide homogeneous areas provides development rights to land whereby development is restricted to being transferred to (and bought by the owners of) other land where development is allowed.

By the same token, the use of transferable development rights in the USA responds to the need of facilitating acceptance of planning limitations by landowners through a compensation tool.

14.5   The Economic Justification for Value Recapture

Urban land rent represents the objectivation in economic and price terms, and the assignment to each site, of the value that single economic actors implicitly or explicitly attribute to each spatial "situation" in their processes of definition of locational choices, productive or residential. Put otherwise, it is the value of a scarce land resource, characterized by particular specificities in terms of proximity, accessibility, context conditions, that appears as a market price when a market exists, or only as a "shadow price" when it implicitly arises from locational and mobility decisions.

Therefore, rent is anchored to optimization processes, keeps demand and supply of land in equilibrium and accomplishes an optimal allocation of spatial resources among different uses for the entire collectivity (Camagni 2012a, pp. 183–184).[5] In this sense, land rent plays a crucial role in the economy; it is always present in all property regimes, although it of course assumes different forms—those of a price, a utility or advantage for the land user, that of power exercised by the official in charge of locational decisions concerning people and economic activities in a collectivist state. It cannot be annulled by planning decisions but only enjoyed by different persons or social classes.

But rent, as a remuneration of a production factor, namely land, enjoys a special status and consideration in classical economic theory with respect to the remunerations of the other production factors, namely wages and profits. The landowner apparently does not play any direct role in general social production: no action, no fatigue, no risk bearing, no forbearance. His remuneration does not depend on a specific productive performance but rather on totally external elements: on a fertility, provided by nature, in the case of agricultural land,[6] or on the general processes of urbanization of households and activities, on proximity to transport infrastructure or to a "centre", on the "general development of society", as the classical economists put it in the case of urban land.

Therefore, classical economists, like Smith, Ricardo and Marx, or even neoclassical economists like Alfred Marshall, consider land rent as an "unearned income"[7] always implying a monopoly. Marshall (1890, Book VI, Chap. 9, Sect. 351), following Smith, even went so far as to maintain that such incomes could be taxed to even 100% without producing economic upheavals (but certainly

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[5]The role of land rent in allocation optimization of spatial resources is witnessed confronting two land property regimes, the private ownership and the open access cases: in the latter, higher settlement density and congestion is determined in the central areas of the city, leading to land resources exhaustion and huge environmental problems (Evans 1988); Camagni 2012a, Sect. 6.3.2), a case of "tragedy of commons" (Dentinho 2011). Of course, recognizing the social welfare role of land rent does not imply denying the possibility of taxing it.

[6]Only land improvements are remunerated, but accrue to labour and capital.

[7]From a juridical point of view, the term "unearned" links with expressions like "windfalls" or surplus values, but does not automatically mean "undeserved" Fischel (1985, pp. 12–13), quoted in Spaans et al. (2008, p. 28), although it does so from an economic point of view.

producing political ones!). "The sudden appropriation of [land] rents and quasi rents by the State would indeed have" huge political effects; but in economic terms, or "if from the first the State had retained true rents in its own hands, the vigour of industry and accumulation need not have been impaired".[8,9]

A second economic issue concerns the conflict between rents and profits. This crucial conflict is a constant in classical economic thought, from Smith and Ricardo to Marx, and then to Sraffa and Morishima, but it has not been sufficiently explored in recent times. Rents, in both agriculture and cities, appropriate the fruits of the general development of society, imposing a kind of tax on entrepreneurial profits—and on wages—with the risk of jeopardizing capital accumulation, production and jobs.

In the city in particular, landlords appropriate all extra-profits from advanced activities generated by Schumpeterian innovation processes and/or by market power, in the form of:

– *differential land rents* deriving from micro-territorial accessibility;
– *absolute land rents* deriving from agglomeration economies and demand for urban externalities.

Over time, this very fact may generate important relocation processes, selective concentration/ decentralization of activities, urban economic cycles, but also risks of urban crises.

The effects of the rent/profit conflict on urban dynamics may be illustrated with a mathematical ecology model belonging to the family of prey–predator interaction models *à la* Volterra-Lotka (Camagni 2012a, Sects. 8.3–8.4; Camagni 2010), where profits represent the preys and rents the predators. The model explains the possible cycles of urban growth and decline and eventually the urban life cycle of urbanization-suburbanization-disurbanization: as long as urban economic development (Y) is reduced by rents (R) and rent-seeking activities, this reduction is subsequently due to reducing rents themselves (the predators) and to give rise to a possibly ensuing development cycle:

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[8]Interestingly, this passage, suspectable of "georgism", disappeared in the last edition authorized by Marshall of 1920. A possible reason is Pope Leo XIII's Encyclical *Rerum Novarum* in 1891, which branded as subversive both marxism *and georgism*! See Camagni (2012a, p. 193).

[9]Adam Smith, more than a century before, took up a similar position: "Both ground-rents, and the ordinary rent of land, are a species of revenue which the owner, in many cases, enjoys without any care or attention of his own. Though a part of this revenue should be taken from him in order to defray the expenses of the state, no discouragement will thereby be given to any sort of industry. The annual produce of the land and labour of the society, the real wealth and revenue of the great body of the people, might be the same after such a tax as before. Ground-rents, and the ordinary rent of land, are therefore, perhaps, the species of revenue which can best bear to have a peculiar tax imposed upon them". (Smith 1904, V.2.75).

$$y = Y(a + bY - cR)$$

$$r = R(-d + eY)$$

where y and r are the time derivatives of Y and R,

a = growth trend linked to technical change and endogenous urban innovation;
b = returns to urban scale (agglomeration economies/diseconomies);
c = predation effect of rents on growth;
d = growth trend in rents, assumed negative in the absence of economic development;
e = distributive share of GDP nourishing rents.

Figure 14.2 illustrates the possible evolutionary outcomes in the case of constant, increasing or decreasing returns to urban size (b): namely and respectively, a cyclical sequence of urban growth and decline phases, explosive instability or a possible oscillatory convergence in the presence of endogenous limits to urban size.

The presence and growth of land rents is inescapable in periods of economic growth and strong urbanization processes. But rents, as "unearned" incomes, can be taxed, with an intensity depending on the power relationships among the various classes and vested interests of the society and on its cultural and civic values.
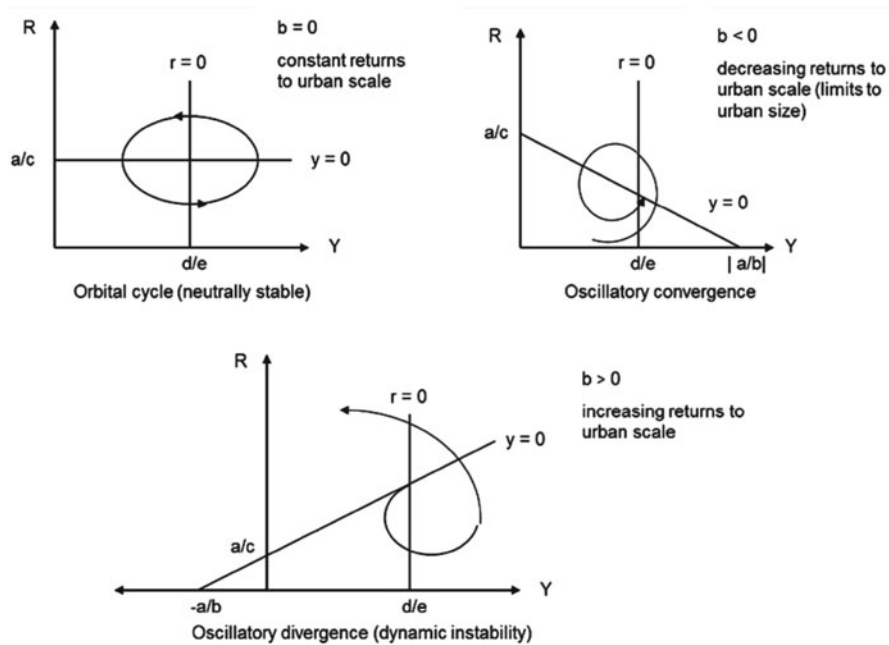
Fig. 14.2 The rent–profit conflict through a prey–predator modeling. Source: Camagni (2010, 2012a)

In the short run—assuming the total amount of surplus values emerging from urban transformation and development as given—the distribution of this surplus between the private and the public sphere certainly represents a zero-sum game. This fact implies a difficult and tough bargaining process, where public authorities may easily succumb as a consequence of information asymmetries between private and public parties, the lack of sufficient incentives for public officials, the lack of the requisite skills in public administrations in many countries, fuzzy legislation on taxation levels and pervasive non-transparency concerning the actual and best international practices in regard to the desirable and possible taxation of rents in different temporal and spatial conditions.

But in the long term, the game could turn into a positive-sum one, if a better quality of the urban context and an enhanced efficiency of the whole system is due to generation of higher attractiveness, competitiveness and growth.

If a share of recaptured land rents can be channelled towards urban infrastructure improvement and enhanced livability services, a virtuous cycle of continuous urban well-being, competitiveness and growth may be triggered (see Fig. 14.1, before), turning the game into a win-win one, to the benefit of real estate developers too.

A strategy of this kind is increasingly advocated by international agencies like UN Habitat with a further rationale: fighting the corruption that huge unearned and unjustified enrichments are likely to boost in the real estate and public works domain, endangering not just the growth potential of cities but also the quality of planning decisions and consequently of urban life (Fig. 14.3) (UN-HABITAT 2013, p. 137).
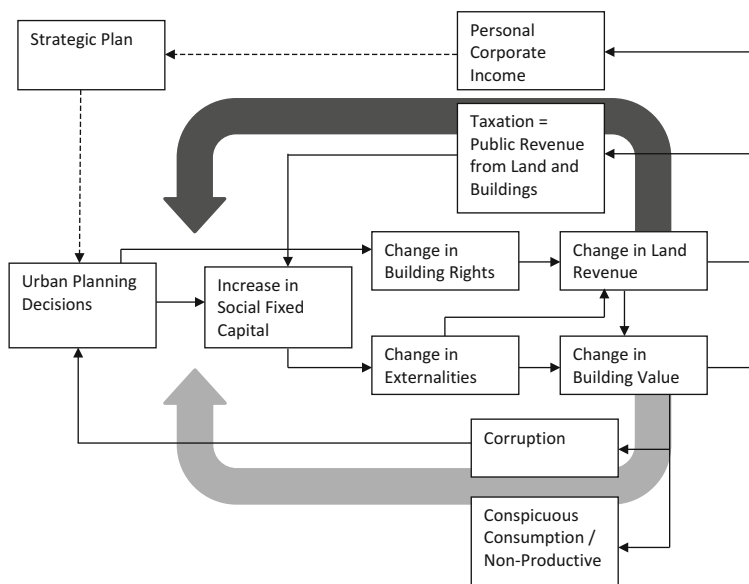
Fig. 14.3 The virtuous cycle of land value creation. Source: adapted from Roberto Camagni. In: UN-HABITAT (2013), p. 137

14.6   A Tentative Comparative Assessment of the Economic Relevance of Planning Obligations and Capital Gains Taxation in Estate Developments

In this section, I shall address the topic of the dimension of rents in urban transformation processes and the dimension of the planning obligations on average paid by developers in various countries, with particular regard to Italy. The approach must necessarily be international, even if the task is complicated by the fact that different legislative and regulatory regimes use different definitions, language and even logic in local obligations and fees.

Moreover, in many countries, among them Italy, this field exhibits an extremely high level of non-transparency and lack of official information. Where fees are not paid in cash but in direct provision of local infrastructure and public buildings, they are difficult to quantify; the ceding of areas to the municipality is by its nature difficult to evaluate in monetary terms, and it does not directly impact on a project's private cost if it does not reduce the building volumes achievable. It is often the case that higher fees defined in negotiations are matched by greater advantages granted to the developer in terms of building volumes with respect to the limits set by law and the planning authorities. Finally, the market value of the buildings constructed is difficult to assess, both because it requires an ex-post evaluation, to be compared with planning obligations, and because the declarations of developers generally tend to be reductive.

A recent study on significant and emblematic cases ('virtuous' ones realized through plan agreements) of urban residential development in Rome and its province in the 2000s[10] (Provincia di Roma 2013; Camagni and Modigliani 2013) estimated the surplus values deriving from those processes. Highly cautious estimates based on the declarations of the developers showed a share of surplus value on the final value of the buildings constructed greater than 50% in the case of three projects in the city of Rome (Table 14.1), and indeed greater than 70% in one of the three projects located in the province.[11]

A similar survey conducted on a large-scale Integrated Intervention Programmes in Milan reached very similar conclusions (Camagni 2008). After marginally correcting only some obviously underestimated revenue items in the declarations of developers, the overall surplus value generated and incorporated in the value of the land was calculated at 48% of the final value (Table 14.2).

In the case of Rome, the overall percentage represented by urbanization fees was between 3% and 7% in the Rome projects and 4–5.6% in the projects outside Rome.

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[10]Provincia di Roma (2013). The analysis of urban rent and urbanization fees was carried out by the present writer with the assistance of Daniel Modigliani, Andrea Dongarrà and Marco Tamburini.

[11]It should be stressed that this result was obtained without including in the surplus value the developer's gross profit, 8% interest on the overall costs and a gross profit of the developer, inclusive of taxes, equal to 20% of the general costs, including interest. See: Camagni and Modigliani (2013).

Table 14.1 Surplus values in 3 negotiated programmes in Rome

Projects values (000.000 Euros) and indexes	Bufalotta	Lunghezza	Polo tecnologico
V1 = total costs (incl. profits of construction company + devel.)	666.4	209.6	326.6
V2 = extra profit on the area	272.1	92.6	161.2
V3 = value of the area	483.7	164.6	286.6
Vf = final value of constructed buildings	1422.2	466.7	774.4
PL = V2 + V3 = total surplus value	755.8	257.2	447.8
PL/Vf = share of total surplus on final value (%)	**53.1**	**55.1**	**57.8**
V3/Vf = share of land value (%)	34.0	35.3	37.0
V1/Vf = share of building costs (%)	46.9	44.9	42.1
Obligations/Vf = share on final value of buildings (%)	**6.2**	**7.0**	**3.0**
Agricultural value of land (15 e/mq)	49.7	9.8	10.8
Share of agricultural land value on final value (%)	3.5	2.1	1.4
Share of value increment on land (V3/Vf corrected) (%)	30.5	33.2	35.6

Source: Camagni and Modigliani (2013) (most relevant indicators emphasized)

Table 14.2 Milan: budget of a large-scale residential integrated

Intervention Programme	Official declaration (%)	Corrected values[a] (%)
Urbanization fees	8.93	7.04
Negotiated (extra) fees	1.44	1.13
Public obligations	10.37	8.17
Building costs and profits	51.53	40.60
Financial costs	3.00	2.35
Initial value of the area	26.17	20.62
Total costs	91.07	71.74
Surplus value	8.93	28.26
Market value of the development of 30,000 for parking places	100.00	100.00

Source: Camagni (2008)
[a]Cautious corrections regard: market value of the sq.m. of apartments (from 3500 to 5000 euros) and 50,000 euros instead

In the Milanese case, the fees reached 8% of the value of the buildings constructed, but they also included monetization of the land not ceded to the municipality for infrastructures, green spaces and car parks.

As will be seen, the margins of surplus value are extremely high and probably underestimated. They are of a magnitude that no manufacturing branch of industry could achieve, while the fees paid for public services are proportionally very low.[12]

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[12]These conclusions have been confirmed by recent surveys conducted by the CRESME, the most important institute of real estate research in Italy; see Bellicini (2011).

Direct international comparison on the incidence of the latter in the value of the buildings constructed seems unforgiving: in Munich, thanks to an agreement laboriously reached between the city administration and developers at the end of the 1990s (the so-called SoBon model: social and fair real estate development), the incidence of fees and other public services amounted to between 27% and 31% of the built value—the difference with respect to the Italian case being represented mainly by fees for social housing (Camagni 2008) (Table 14.1).[13]

It is also of interest to compare Italian municipalities in terms of urbanization fees in euros per built square metre. According to a survey conducted by the Assessorato al Territorio of the Emilia-Romagna region in the years 2010–2012, the fees for residential housebuilding ranged, in the large municipalities, between 100 and 150 euros per square metre, with low values in Bologna (98 euros), relatively high ones in Milan (244 euros) and maximum ones in Florence (480 euros). In the overwhelming majority of cases, these "urbanization" fees are not even enough to cover the costs of primary urbanization.

Also in this case the result is disappointing. Even given that through planning negotiations it is possible to increase the share of planning obligations (though the above-cited experience of Milan indicates that these extra fees are minimal), if one considers that in the cities cited real estate values are on average much higher than 3000 euros per square metre, and that they easily reach 10,000 euros in the central and most qualified zones of the largest cities, confirmed in the Italian case is an imbalanced division of the surplus value of development between the public and private spheres. As mentioned above, international comparisons are difficult. While the above described difference between the Italian and the German/Bavarian traditions is striking, it is not possible to make similar comparisons with other countries. Nevertheless, some considerations are possible.

In France, the general fees imposed on any building activity have recently been simplified into a single tax, the *taxe d'aménagement*, which came into force on 1 May 2012. The amount of the tax seems similar to, if not even lower than, the average tax imposed in Italy.

But available in France is a powerful instrument with which to manage the transformation of extensive and important areas within the dense city with strong public goals: namely the institution of *ZAC—Zones d'Aménagement Concerté*, areas where planning and development are run though private–public companies of a private juridical nature, the *SEM—Société d'Economie Mixte*, in which the public party is the majority shareholder. The cost of building the necessary infrastructure is assigned to the private parties. The public party imposes the

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[13]Information is taken from: Landeshauptstadt München, Referat für Stadtplanung und Bauordnung, *Social and fair development of real estate: the Munich way*, presentation, 2003; City of Munich, Department of urban planning and building regulation, *Shaping the future of Munich—Perspective Munich: strategies, principles, projects*, 2005; T. Bauernschmidt, Deputy Head of the Central Division for Urban Planning, "Investors' contribution to municipal town planning project costs", public presentation, 2007; website of the city; other information received by the above mentioned Department. The author kindly acknowledges support and cooperation.

implementation of public spaces, facilities, affordable housing, the quality of the comprehensive plan; it holds, in kind or money (profits), control over a large proportion of the surplus generated by the transformation.[14]

In Spain, in the case of Barcelona, the development fees are higher than in Italy. They require a previous payment for infrastructure and services (furnished by the municipality) encompassing also modern equipment like fibre optics networks, while obligations require an extra fee in the form of an extra transfer of land parcels as a recapture of the transformation surplus. This transfer is not particularly costly for the developer, because it does not reduce the building volumes, generally high in the inner city; but it proves highly important for the municipality for the location and construction of public facilities (Camagni 2012b).

Also the British case seems highly respectful of the public good, not just in terms of general planning principles, values and juridical rules but also in terms of the highly respected planning action and negotiation capability. In this country, especially national taxation on capital gains coming from planning gains and changes in land use was traditionally high ("development land tax"), reaching in some post-war years 60% (and even a top rate of 80% in a few years, 1976–1979) and more recently being settled to 40% (Evans 2004, pp. 94–95). In Italy the same national capital gain taxes, in case of individual persons' and not companies' property, are definitely low: they are fixed to 4% of final total value of the estate through a "substitute" tax (while in the case of companies' property, taxation follows the normal income tax rate).[15]

In conclusion: share of rent (capital gain) coming from land use changes and urban transformation may be very high, but it is rarely computed and presented in a transparent way to the public. Internationally, its taxation widely changes according to national and local taxation systems, which are very difficult to compare. Some first, though quite anecdotal and non-systematic, results show some countries leading in value recapture, such as Germany and UK, while Italy lagging behind.

But more in-depth and quantitative analyses are crucially needed for proper assessment of the distribution of urban transformation values between the private and the public spheres (Table 14.3).

14.7 Concluding Remarks

Cities of advanced countries, especially in Europe and southern Europe, will face new challenges in the coming years because they are crucial tools for the relaunching of both the competitiveness of countries and the well-being of populations. But the crisis has had a devastating effect in this regard by greatly reducing the public resources necessary to boost the modernization and efficiency

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[14]In France in 2007, 1117 SEM were operating, with 54,200 employees, a turnover of 14.5 billion euros and a capital stock of 2.4 billion, 65% in the hands of local public administrations.

[15]See the TUIR, Testo Unico sulle Imposte sul Reddito—Unified Text of income taxation, art. 67–68.

Table 14.3 Munich: budget of residential development projects under the SoBon scheme

	Case A (%)	Case B[a] (%)
Urbanization fees	4.23	1.56
Public services	6.78	8.81
Affordable housing (cost for developer)	20.34	17.00
Total public obligations	31.35	27.37
Total private costs and profits	43.23	47.94
Initial value of the area	25.42	24.69
Market value of transformation	100.00	100.00

Source: Camagni (2008) and footnote 12
[a]Case A is a specific development project; case B is an average evaluation among different projects

of cities and to upgrade what is increasingly called their "territorial capital"—infrastructural, cognitive, human, social and identitarian (Camagni 2009).

Given these conditions, cities and urban public authorities must increasingly rely on endogenous financial resources and in particular on those resources that are generated by the constant development and transformation of the cities themselves, continuing urbanization processes, increasing densities and transformation of land uses from less valuable to more valuable ones. Especially in southern European countries (and also in most developing countries), these resources are largely captured by the private sphere in the real estate sector in terms of rents and surplus values generated by the very existence of cities and by the action and planning decisions of the local public administrations. A recapture of at least a share of these resources and their reorientation towards public investments in urban quality seems necessary and possible, well beyond what is already being done in most countries.

The legal and economic rationale for this recapture is clear and has been highlighted throughout this paper. What is necessary now is—besides better understanding of the real amount of the wealth generated by urban transformations and its present unequal distribution between the private and the public spheres—greater political courage and civic will. In many countries, among them Italy, the amount of resources lost by the public governments in favour of the developers "lobby" is huge, and it often constitutes the source of public and private corruption.

While in the short run, this may seem like a zero-sum game for the distribution of a given and fixed amount of resources, in the longer run the situation may turn into a virtuous, win-win situation, because a renewed, modernized and more vibrant urban context might become the driver of renewed general development.

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Part III

On Regional Policies and Spatial Planning

Regional Development and Urban Dynamics

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Peter Nijkamp

15.1 Regional Development: A Sketch

Regional development—and in a more general sense, spatial-economic dynamics—has already a long history in economic and geographical thinking. In the early history of economics, differences in resource availability were often seen as the major cause of spatial disparities. Wars and political turbulence were often the consequence of the struggle for natural resources (gold, oil, coal, etc.). In a more peaceful way, international or interregional trade acted as mechanism to create mutual welfare benefits from unequal availability of resources, without resorting to political or military violence (see also Pirenne 1927 for a broad historical overview).

In addition to resources, also other geographical factors played a major role in regional dynamics, in particular transportation and distance frictions. Adam Smith already mentioned the locational advantages of places located near seashores or river banks, as—in earlier times—they were better positioned to reap the benefits of trade. In essence, this phenomenon returns in the new economic geography, where agglomeration advantages and trade in an open spatial system are the drivers of economic welfare.

In the history of regional science, various path-breaking contributions have been produced to explain spatial-economic patterns—and their evolution—as a result of economic forces. For instance, the seminal work by Von Thünen (1826) combines essentially spatial scale advantages and transportation distance frictions into a partial equilibrium model for the organization of heterogeneous space.

Many decades later, Weber (1911) made a more analytically-oriented attempt to explain differences in spatial positions of economic activities based on gravity

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centres and transportation costs, with a view to achieving an optimal location of these activities.

Before and during the WW II period, Lösch (1954) made a genial contribution to a better understanding of regional development issues by combining trade, spatial scale advantages and competition among firms to map out a regional-economic equilibrium state. He laid the foundation for modern regional economics, from the perspective of spatial-economic analytics.

In the period after WW II regional science came to full maturity, mainly as a result of the seminal studies of Isard (1956, 1960). It is noteworthy that his sharp analytical contributions did not address directly regional policy as an institutional mechanism to improve regional welfare positions or to mitigate spatial disparities; he offered much more the analytical apparatus needed to understand and restore regional balances. But his work prompted a variety of original contributions to regional development theory and practice, based on notions such as Marshallian districts, growth poles, growth centres, communication axes, competitiveness poles, and so forth. Such growth concepts have been advocated and experimented in different parts of the world. There has been an avalanche of studies on regional growth and regional policy since the 1950s (see for an overview inter alia Capello and Nijkamp 2009; Kourtit and Nijkamp 2017).

In the past decades a specific contribution to regional economic growth and spatial competition has been provided by Porter (1990), who has introduced the concept of industrial clusters as an anchor point for selective economic and regional policy. This notion takes for granted that competitive economic specialisation and concentration in favourable areas are the determinants of the relative performance conditions of corporate organisations and spatial entities. Clearly, in the aftermath of the spatial cluster discussions and related policy interventions several critical issues have been raised, in particular on the question whether (i) a cluster has predominantly an economic or a geographic connotation and whether (ii) a cluster is a spontaneous organism as a result of competitive business forces or has to be stimulated through dedicated policy interventions (see also Nijkamp 2016).

The wide variety in regional development studies from different perspectives is a sign that the general approach to traditional regional development policy—by providing financial stimuli mainly through subsidies to improve the competitive power of regions—is debatable and fraught with uncertainties. A massive number of different studies has been performed to assess the (limited) success of regional policy and to suggest other ways forward, be it often also with disappointing outcomes.

In the whirlpool of pluriform studies on regional development policy, there is one author who stands out in terms of solid and original thinking on regional growth, viz. Roberto Camagni. The collection of studies in the present volume dedicated to him witnesses the great mind of a scientist who has uninterruptedly and independently developed novel ideas on spatial dynamics, coined here the 'Italian School'. In the next subsection I will summarize and frame his five contributions included in Part III of this volume. Based on these five articles, I will then in all modesty, but in respect for the 'grand master' take up some of his ideas, with the aim to draw some strategic concepts and new frameworks for regional development policy in an urbanized world.

15.2   Regional Development: The 'Italian School'

Italy has for several decades been an experimental test bed for regional development issues. In the first place, numerous studies have been devoted to one of the most glaring failures in regional policy, viz. the persistent welfare disparities between the North and the South (the Mezzogiorno) of Italy. Despite massive subsidies—from both national and supranational authorities (notably the EU funds)—the policy success of such interventions has been extremely meagre. The relative welfare divide between these two macro regions of the country has been rather stable over more than almost half a century. The structural nature of these disparities is clearly not unique, and can also be found—be it to a lesser extent—in other countries (like Andalusia in Spain or the Appalachian Mountain area in the US). Such persistent income and growth disparities have prompted much criticism on the traditional way of executing regional policy, not only in Italy but also elsewhere.

In the second place, beside the widely shared concern on the low success in coping with the structural North-South divide, there is also a sunny side on regional development in Italy, viz. the widely praised and unprecedented success of the so-called 'Third Italy', mainly concentrated in the Emilia-Romagna area, which exhibits a boost of innovative—mainly small-scale—business activities. The surprising performance of this area is often used as a 'model' for effective regional development strategies. This phenomenon has also prompted an intense interest from the side of many regional scientists in Italy and elsewhere.

Against the background of these two regional development 'laboratory experiments' in Italy, we have to interpret the intellectual contributions of Roberto Camagni. Rather than being actively engaged in less fruitful policy debates *per se*, he has made in his great career a laudable attempt to provide the cornerstones for a strategic and fundamental perspective on the rise and decline of regions, taking Italy as a frame of reference, but by offering new horizons with a great relevance for regional development issues elsewhere. The five chapters in volume C of this opus exemplify and highlight his great academic skills and insights. I will briefly put forward some of his most illuminating ideas from these five contributions.

In his study on 'Rationale, Principles and Issues for Development Policies in an Era of Globalisation and Localisation: Spatial Perspectives', Camagni takes for granted that globalisation is a fact, not an option. He then argues that the openness implied by globalisation will have drastic implications for regional growth, in the sense that some will win and others will lose. Thus, regions are to be positioned in a new battlefield of spatial-global competition. Consequently, regions are critical actors who have to enhance their competitiveness strategies. This calls for new views on and instruments for regional growth policies, as well as for new theoretical-conceptual paradigms and methodological approaches, in which the concept of a 'territory' plays a fundamental role.

It is noteworthy that Camagni in a way may be seen as a disciple of the grandfather of economics, Adam Smith, who also advocated free trade in our open economy as a source of welfare increase for all players. It is however also

noteworthy that to some extent he takes a different stance on regions than Lösch, who was concerned about a political-territorial view on regions as spatial actors, as this might create antagonies which might lead to a different view on regions as purely economic units which have to struggle to survive in a competitive battle. An important message from the above perspective on regions as territories is the policy orientation towards territorial competitiveness and quality as well as public service efficiency in a specific region. Against this background, spatial specialisation and local synergy among local stakeholders are important signposts for spatial development policies and planning.

In another study, on 'Regional Innovation Patterns and the EU Regional Policy Reform', Camagni adopts a supra-national (EU) perspective. He criticizes the simplified core-periphery model, and argues that smart specialisation based on innovative strategies is a realistic and plausible way to mitigate the dichotomy between core areas and peripheral areas. This approach calls in his view for a new taxonomy of European innovative regions that is inspired by tailor-made regional innovation policy, in which embeddedness and connectedness are crucial parameters. The plea for region-specific and sector-specific innovation systems needs of course a wealth of information, for instance, through a Regional Innovation Scoreboard. Also in this contribution, Camagni argues that territorial specificities in a knowledge-based regional innovation system are essential.

In this contribution, Camagni enriches in fact the debate on Porter's industrial cluster conceptualisation, as here the industrial—sectoral and regional—urban features are integrated in a more coherent framework. This is clearly exemplified—in line with his previous paper—in his plea for a territorial innovation perspective, in which the meaning of a 'territorial' perspective has a broad socio-economic, technological and geographical-cultural connotation in a given region.

Another study in this volume addresses the issue of 'Strategic Planning, Relational Capital and Community Governance'. This paper offers a clear action-oriented approach to local and regional development planning. Much emphasis is placed here on locally connected systems of small enterprises ('milieux innovateurs'). Local and regional strategic planning boils then essentially down to creating and managing relational or social capital as the glue for spatial synthesis or coherence. Clearly, this calls for initiatives to build and maintain institutions, rules and norms that reduce transaction costs in a spatially demarcated economy. Especially, a city has the opportunity to offer an entrepreneurial milieu—based on socio-cultural proximity—, in which network relations leading to collective learning mechanisms may play a central role.

It is noteworthy that Camagni adds here a new dimension to traditional individually-oriented localisation theory (e.g., as advocated by Weber) by looking at firm strategies and performances from the perspective of actors' relations. The local milieu provides here again the arena for local and regional development, which supports his 'territory' thesis.

An important question is of course how robust or successful regional policies (e.g., EU cohesion policies) are in an era of economic recession or crisis. Camagni discusses these issues in his article on 'Rationale and Design of EU Cohesion

Policies in a Period of Crisis'. He argues that in an economic downturn focused regional policy initiatives are needed to rebalance uncontrolled spatial-economic disparities, so as to favour the development potential of all places represented by their territorial capital (material, human, cognitive, social and relational). This policy orientation would not be based on a 'one size fits all' strategy, but on each region's specificities, competitive advantages and needs, engaging all relevant resources. In this contribution, the concept of territorial capital is prominently articulated and enriched by introducing the notion of 'territorial platforms'.

It is interesting to observe that Camagni introduces here managerial concepts for territorial capital, that come rather close to Porter's 'cluster management' principles as advocated in his diamond constellation. Camagni emphasizes clearly more the spatial and supra-regional aspects of regional growth strategies, with a particular view to the need for a balanced nature of any long-term development process.

Finally, Camagni presents in his paper on 'Territorial Impact Assessment—TIA: A Methodological Proposal' not only an analytical framework for assessing territorial cohesion (through three factors of territorial efficiency, quality and identity), but also an operational contribution through the introduction of a territorial impact model incorporating the above mentioned three factors. This is of course a very important step forward in a territorial analysis of spatial development and follows the footsteps of Isard who has advocated that solid analytical and operational tools are a *sine qua non* for regional development policy.

The above concise description of a limited set of Camagni's great scientific achievements brings to light his profound interest in original and relevant research, which meets high scholarly standards and offers new perspectives on the complexity of the space-economy. His novel conceptualisation of 'milieux innovateurs' and of the 'territorial capital' thesis sheds new light on both dismal regional disparities (such as the North-South divide in Italy) and refreshing new and creative development with great opportunities (such as the 'Third Italy' phenomenon). A nice and systematic description of his ideas on territories can be found in Camagni (2009). His work deserves to be read and appreciated by scholars in the regional science field. He may be seen as one of the foundation fathers of the 'Italian School' in regional science. As a modest attempt I will in the next section offer a few ideas that are inspired by Camagni's seminal contributions.

15.3 From Territorial Capital to Resourceful Regions

Camagni's scientific paradigm for regional development is based on the territoriality principle, in particular on the concept of territorial capital and territorial platform. This thesis argues essentially that next to generic production factors also region-specific assets are critical for enhancing the region's performance in a competitive and open space-economy. As indicated in the above concise overview of five important studies of Camagni, there are at least three determinants of regional growth, viz. human capital, infrastructure capital and social capital. These need to be further incorporated in a testable model of regional development.

In a recent study by Kourtit et al. (2017) an attempt has been made to take the arguments of Camagni somewhat further by emphasising that regional growth is not a linear process that is deterministically determined by a fixed set of inputs, be it production factors or government subsidies. In the latter study the focus has been more on contextual factors, that may influence the economic performance of regions, not as necessary **and** sufficient conditions, but as facilitating and desirable conditions. This context-dependent approach has recently been further formalized through the concept of a *resourceful region* (see Nijkamp 2016).

The background of this approach is formed by the so-called possibilism paradigm earlier developed in the original work of Vidal de la Blache (1903). This geographically-inspired theory was designed as a counter-theory against spatial determinism. This approach has later on been re-modelled in the social sciences in the form of the capability theory (see e.g. Basta and Moroni 2013; Basta 2014). This analytical framework addresses in particular the importance of goods, services and institutions that enable people or actors to achieve certain goals. From a spatial perspective, one may argue that regions provide multi-dimensional choice spaces which are of course also constrained due to lack of resources.

The above notions have led to the design of the notion of a resourceful region. This concept stipulates that regional welfare (or in a more general sense, regional performance) is co-determined by the locally (or territorially) available resources. Such resources do not only comprise natural resources, but also intangible resources including social-institutional settings, cultural attitudes and the like. They are by no means sufficient conditions, but at least desirable or necessary contextual circumstances. Such resources may be territorially-related (in the spirit of Camagni), but may also have a broader spatial scope (e.g. entrepreneurship attitudes).

In Nijkamp (2016) the resourceful region approach has been further developed. We will only offer here a concise systematic representation based on the so-called Pentagon model (see Capello et al. 1999). This analytical approach takes normally for granted the existence of five prominent factors that shape the optimal performance of a region, summarized in the acronym XXQ (the highest quality of regional performance). This is sketched out in Fig. 15.1.

In this figure *culture* stands for such factors as local identity, local mind set, historical attitude, traditions, arts, knowledge orientation, etc. *Open mind* comprises

Fig. 15.1 A Pentagon model for a resourceful region
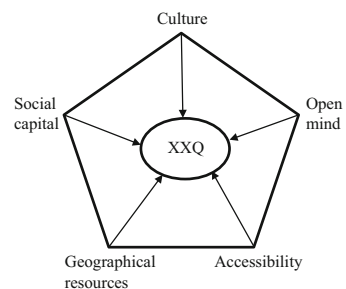
inter alia human capital, original thinking and acting, cognitive ability, non-conventional attitude, creative and innovative behaviour, communicative attitude or entrepreneurship. Next, *accessibility* refers to transport, mobility, trade, logistics, connectivity, physical and political borders etc. The factor of *geographical resources* describes the availability of both productive resources such as coal or oil and consumptive resources such as environmental quality or safety. And finally, social capital is composed of relational capital, social networks, social media contacts and so forth, in the vein of Camagni.

It should be added that the above discussion on regional development and spatial disparities does not only apply to regions in a strict traditional sense, but also to cities. Cities in the modern space-economy become increasingly the 'natural habitat' for both residents and firms, to the extent that nowadays we speak of the 'urban century'. Cities are—just like regions in our age—no longer 'islands of isolation', but globally acting agents with a significant spatial (supra-local and trans-border) impact (see also the notion of the 'New Urban World' advocated by Kourtit 2015). To the same extent that we need to explore and depict the success conditions, strategic profiles and global impacts of regions, we need to map out the success conditions and spatial implications of (large) cities, including smart cities. Cities tend to become the 'work horses' of regions, and in many cases even of nations. It is the great merit of Roberto Camagni that he has also in his own rigorous manner called attention for the development of cities as prominent actors in the complex and interwoven space-economy of regions and nations.

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Regional Innovation Patterns and the EU Regional Policy Reform: Towards Smart Innovation Policies

16

Roberto Camagni and Roberta Capello

16.1 Introduction

In the recent EU regional policy debate, two main documents captured the interest of experts: the EU Report *Europe 2020* (European Commission 2010a), which presents the general context in which Europe will act in the next decade, and the Barca Report to Commissioner for Regional Policies, Danuta Hubner (Barca 2009), paving the way towards a reformed regional policy. The first Report proposes a strategy based on three pillars—namely, smart, sustainable and inclusive growth.[1] The second report discusses and proposes a new process of EU Regional Policy Reform, launched in preparation of the new programming period 2014–2020; in particular, the rationale, economic justification, conditionality, process design and delivery style of regional policy itself are discussed, supplying wide material for institutional and political decisions.

At the cross-yard of these two streams of reflections, an interesting policy debate was launched, related in particular to the 'smart growth' pillar, stressing the need to conceptually integrate the tasks put forward by the *Europe 2020* report and the new cohesion policy reform into a common framework. On the one hand, *Europe 2020*

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[1]These pillars may look relatively autonomous, touching the challenges of the knowledge society, of the environment and of the equitable society, but in fact are integrated with each other and "mutually reinforcing". Sustainable growth is pursued not just per se, but as a possible driver for "resource efficiency" and consequently "competitiveness"; inclusive growth is requested for the sake of social equity but also as a means for the "acquisition of skills", social cohesion and social capital.

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is seen as lacking a more explicit territorial dimension, a way through which to engage all potential and dispersed actors to contribute to the Agenda with their decision processes, in a bottom-up way (Camagni 2011). On the other hand, the EU policy reform should be conceptualized in a way to be able to contribute to the achievement of the three pillars (smart, sustainable and inclusive growth) of *Europe 2020* Agenda; in particular, the latter might become the occasion for re-launching a knowledge-intensive growth model for Europe on a regional base, supplying operational answers to the request of one of its 'flagship initiatives', namely 'Innovation Union'.

The EU official document *Regional Policy Contributing to Smart Growth in Europe* (EC 2010b) is a first official move in this direction, calling for the need to identify sectors and technological domains on which regional policies should be tailored to promote local innovation processes in these specialization fields. The document fully subscribes to the 'smart specialization' (RIS3 - Regional Innovation Smart Specialization Strategy) strategy suggested by the 'Knowledge for Growth' expert group advising to former European Commissioner for Research, Janez Potocnik (Foray 2009; Foray et al. 2009), advocating for a consistent matching between investments in knowledge and human capital and the present industrial and technological "vocations" and competences of territories. "Strategies have to consider the heterogeneity of research and technology specialization patterns" (Giannitsis 2009, p. 1).

This paper is a contribution in the same direction. It enters the debate on smart specialization strategy by stressing the need to overcome the simplistic dichotomy between core and periphery in the Union, between an advanced 'research area' (the core) and a 'co-application area' of general purpose technologies (the periphery)—present in the original but also in subsequent contributions. A slightly more complex but similar taxonomy was also proposed by OECD, pointing out a threefold partitioning—'knowledge regions', 'industrial production zones' and 'non-S&T driven regions' (OECD 2010, 2011). The geography of innovation is much more complex than a simple core-periphery model: the capacity to pass from knowledge to innovation and from innovation to regional growth is different among regions, and the identification of specific 'innovation patterns' (Capello 2012) is essential to build targeted normative strategies, well beyond what is proposed by the smart specialization model. Regional 'innovation patterns' may be found empirically in the way knowledge and innovation are developed inside the single regions according to the nature of their traditional knowledge base and productive specificities, and/or are captured from other regions via cooperation, scientists and professionals mobility, market procurement and trans-regional investments.

In this paper 'smart innovation policies' are advocated. They are defined as those policies able to increase the innovation capability of an area and to enhance local expertise in knowledge production and use, acting on local specificities and on the characteristics, strengths and weaknesses of already established innovation patterns in each region.

The two key concepts of 'embeddedness' and 'connectedness'—put forward in the recent debate on RIS3—are starting concepts around which smart innovation policies could be designed: policies have to be embedded in the local reality, in

local assets and strategic design capabilities, and have to guarantee the achievement of external knowledge through strong and virtuous linkages with the external world (McCann and Ortega-Argilés 2011). However, this is not enough: a 'smart innovation' strategy goes a step forward, taking into consideration the R&D element but adapting the two concepts of 'embeddedness' and 'connectedness' to the specificities of each 'pattern of innovation'. Smart innovation policies look for targeted interventions—appropriate for each single territorial innovation pattern—with the aim to reinforce regional innovation process, to enhance the virtuous aspects that characterize each pattern, and to upgrade and diversify the local specialization into related technological fields (ESPON 2012).[2]

The paper is organized as follows. The debate on smart specialization is illustrated in Sect. 16.2 together with a reflection on its acceptability in a regional policy context. The need for the identification of territorial elements supporting innovation patterns to build a sound and efficient regional taxonomy of innovative regions is presented in Sect. 16.3. The new workable conceptual framework on which regional innovation policies should be developed is built in Sect. 16.4. Smart innovation policies are then presented (Sect. 16.5), leading to some concluding remarks (Sect. 16.6).

16.2   The Smart Specialization Debate: Embeddedness and Connectedness

The smart specialization approach was developed with the aim to find an explanation—and a consequent rational strategy—for the large R&D gap between Europe and some key trading partners. The most straightforward reason for the knowledge gap was outlined in the smaller share of European economy composed of high-tech, R&D intensive sectors. A second reason of the gap was pointed out in the spatial dispersion of the limited R&D efforts, generating insufficient critical mass and investment duplications, inefficient resource allocation, and consequent weak learning processes (Pontikakis et al. 2009).

On the basis of this diagnosis, a rational and concrete proposal was put forward by the "Knowledge for Growth" expert group. It advocates differentiated policies for 'core' and 'periphery' regions, the former able to host laboratories and research activities on general purpose technologies (GPT), the latter oriented towards the identification of their 'knowledge domain' in which to specialize and towards co-operation with external R&T providers ('co-application of innovation') (Foray et al. 2009; Foray 2009; Giannitsis 2009).

The advantages of such a strategy are strongly underlined in the smart specialization debate, namely:

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[2]Most of the ideas presented in this work were elaborated by the authors within the ESPON KIT Project. For the final report of KIT, see http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/kit.html

– the possibility to achieve at the same time a "polarization" and a "distribution" of research activities in space. GPT research activities would achieve the critical mass of financial and human resources necessary to their efficient development, reinforcing the idea of a European Research Area (ERA); peripheral areas would not be penalized, taking advantage of financial resources to support the application of technological advances to their specific specialization fields;
– the achievement of a more productive use of the potentials of each region—defined in terms of traditional competence and skills, tacit knowledge and specific innovation processes—that would be reinforced by investments in human capital and research able to match each region's innovation profile;
– the development of cumulative learning in advanced R&D activities and the consequent exploitation of increases in R&D productivity;
– the creation of synergic effects between GPT and co-applications, thus increasing the size of GPT markets and the returns on R&D investment, enlarging at the same time the potential for technological adoption, adaptation and diffusion.

An important caveat is stressed concerning the achievements of the above mentioned advantages: the RIS3 approach makes the strong assumption that an area is able to discover new specialization fields inside its 'knowledge domain', i.e. well defined innovation niches on the basis of its present competences and human capital endowment, in which it can hope to excel in the future also thanks to synergetic policy support (Pontikakis et al. 2009). Some members of the group are explicit in this sense: "the concept of smart specialization (...) assumes that there are criteria to judge which specializations, and consequently which policy targets are smart" (Giannitsis 2009, p.4). In other words, a consistent matching between investments in knowledge and human capital and the present territorial 'vocations' represents a difficult and crucial challenge, inpinging on a creative and by no means mechanistic decision process.

On this particular aspect, the RIS3 argument is very clear: the search and discovery process around the traditional specialization has to be a bottom-up process, in which local entrepreneurs are identified as the leading actors, being the main knowledge and creativity keepers, interested in efficiently exploiting existing cognitive resources and driving their re-orientation towards new innovative but related fields. For the same reasons, the smart specialization expert group warns against the use of a top-down approach for the identification of specialization, which could be disruptive for an otherwise efficient policy strategy.

Besides specialization and embeddedness in the local knowledge domain, the RIS3 calls for particular attention to the connectedness among different geographical areas and knowledge domains; cooperation linkages represent the main potential for learning, either through the integration of different knowledge bases, a general purpose and an applied one, or through best practice of innovation application.

The main policy message of the smart specialization argument is the inappropriateness of the 'one-size-fits-all' policy which could be derived from a fast and superficial reading of the *Lisbon 2000* and *Europe 2020* agendas. When a regional

perspective is adopted, in fact, an aggregate policy goal of 3% of the EU GDP to be invested in R&D/innovation shows its fragility in supporting the increase of the innovation capacity of each region; on the other hand, different evolutionary specializations based on specific local competences and vocations call for differentiated and region-specific innovation policy targets (Pontikakis et al. 2009).

What is acceptable and what is not in the smart specialization argument from a regional science and regional policy perspective? In answering to this question, one has to keep in mind that the RIS3 discourse was born in a sectoral, national and industrial policy context, nurtured mainly by industrial economics specialists, and that only very recently their argument was assumed into a regional policy context.

The main ideas behind the strategy—namely specialization, embeddedness and connectedness—are for sure fully acceptable and welcome. As the main literature in the field of regional innovation suggests—from the *milieu innovateur* theory to the regional innovation system approach and the learning region (Camagni 1991; Lundvall and Johnson 1994; Tödtling and Trippl 2005)—the way in which regions evolve and innovate is deeply rooted into slow localised learning processes, fed with information, interaction, long-term production trajectories, appropriate investments in research and education. Like all learning processes, they are inherently localised and cumulative, as they embed in human capital, interpersonal networks, specialized and skilled labour markets, local governance systems; therefore they are highly selective in spatial terms and require ad-hoc local policy interventions to be adequately supported (Camagni 2001; Quévit and van Doren 1997; Camagni and Maillat 1995). Thanks to the smart specialization approach, the inadequacy of a 'one-size-fits-all' policy for innovation at regional level is decisively transferred from the scientific literature into the institutional debate.

The need for connectedness is also stringent in modern times and widely acknowledged: since knowledge has more and more a complex nature, cooperation and networking with selected external competence sources is necessary for the attainment of complementary pieces of knowledge, avoiding lock-in with respect to local historical specializations (Camagni 1991).

Also the RIS3 proposition concerning the nature of the search and discovery process about the appropriate differentiation and upgrading strategy of local specialization fields looks particularly interesting, as it touches two relevant theoretical points:

– the collective nature of the learning processes inside those special places, characterized by intense local synergies and interpersonal interactions that are the industrial districts/milieus and the cities, where the learning process embeds into the dense fabric of SMEs and into the local labour market (Camagni 1991; Capello 1999; Keeble and Wilkinson 1999; Camagni and Capello 2002);
– the similar role played by the local milieu—fostering co-operation, collective action, incremental innovative solutions to technological and market problems, fast diffusion of innovation inside the local territory—with respect to the role of von Hayek's market as 'social spontaneous order' and 'discovery process' (von Hayek 1978): local knowledge and strategic capability is inherently dispersed in

a host of local actors whose decisions and entrepreneurial creativity have to be coordinated in a self-organized way and eventually supported by pro-active and smart policies.

The remarks made by the RIS3 literature about the necessity of achieving a critical mass for R&D spending are more than convincing. Polarisation of research activity in space is not only necessary to provide sufficient support in restricted budget conditions, but it is requested if investment in research has to be efficient, since not all regional contexts are able to take advantage from R&D or human capital investments. Areas in which a very limited amount of knowledge and endogenous innovative activities are present do not receive any advantage from additional, but limited, R&D spending. On the other side, dispersion of knowledge also in remote places following the principle of providing an 'inclusive and smart growth' to all Europe is a political necessity, as well as a forward looking economic strategy.

For all these reasons, the smart specialization approach looks highly valuable, appropriate and a good starting point for further reflections. However, as rightly pointed out (McCann and Ortega-Argilés 2011), the translation of a sector policy, like innovation policy, to a regional setting is not a simple task, and this is where an additional effort can be done.

16.3   The Need for a Territorial Approach to Innovation Policies

While the general philosophy behind the smart specialization argument is widely acceptable, its direct application in regional development policies is questionable. Its pure sectoral logic; its concentration on R&D as the only source of knowledge and innovation; its dichotomous perception of regional innovation processes and patterns are all aspects that have to be overcome or improved in a theoretical, empirical and normative sense.

When utilised in a regional context, the sectoral logic presents two main limits. The first refers to the idea that formal knowledge is the only source of innovation. Instead, different sources of knowledge exist in local economies, with similar importance, appropriateness and positive effects. They mainly concern informal knowledge creation and development, such as creativity, craft capability, practical skills—often embedded in long-standing competence and production tradition in a host of niche specializations—which have recently been labelled as synthetic and symbolic knowledge (Asheim et al. 2011). The second limit is that, starting from formal knowledge in order to identify the degree and capability of each region to innovate, the sectoral logic ignores the variability of regional paths towards innovation itself, on which innovation policies should carefully focus.

Regional innovation paths strongly depend on territorial elements, rooted in the local society, its history, its culture, its typical learning processes. In fact:

(a) knowledge creation is the result of the presence of a combination of material and non-material elements, formal and informal sources. The material elements, like presence of universities and research centres, are for sure important assets, but what makes the difference in knowledge creation are more and more intangible aspects linked to creativity, culture, taste, that represent for local communities a fertile ground for the development of specialized and skilled labour markets, qualified human capital, continuous learning processes, local interpersonal cooperation networks;

(b) invention, innovation and diffusion are not necessarily intertwined. Firms and individuals which are leading inventors are not necessarily also leaders in innovation or in the widespread diffusion of new technologies. The real world is full of examples of this kind: the fax machine, first developed in Germany, was turned into a worldwide success by Japanese companies; similarly, the anti-lock brake system (ABS) was invented by US car makers but became prominent primarily due to German automotive suppliers (Licht 2009). If the distinction between factors enhancing development of new knowledge and those stimulating innovation holds at the national level, it is even more stringent at the local level where specificities in learning processes, quality of human capital, knowledge externalities are present with different intensity. It is certainly true that basic knowledge is created in some regions where most of inventions take place; however, there are also regions developing inventions and product innovations in their specialization fields, either using off-the-shelf general purpose technologies developed elsewhere, or acquiring some crucial knowledge from outside (patents, scientific or technological skills), or establishing inter-regional co-operation networks (as in the RIS3 model of co-invention of applications). Last but not least, there are regions able to imitate, with limited adaptation on innovations that already exist, therefore even lacking any kind of knowledge but being in a measure to find their space on markets;

(c) the existence and importance of knowledge spillovers is widely acknowledged since some decades (Jaffe et al. 1993; Acs et al. 1994). But this reminds us about the importance of proximity and spatial conditions in the dialectic between knowledge creation and knowledge receptivity. Over time, proximity has been interpreted less in terms of geographical space and more and more in terms of cognitive and social space, deriving from similarities/differences in stocks of social and relational capital among regions (Basile et al. 2012). The capacity of an economic system to get advantage from knowledge created elsewhere is again dependent on its culture, creativity and openness to external stimuli; in a word, on its 'cognitive and social space' (Boschma 2005; Capello 2009). Different regions develop different 'cognitive and social spaces' and this explains the degree of their virtual connection, their receptivity and, consequently, the potential knowledge spillovers they may benefit from;

(d) economic growth is not necessarily linked with cognitive or technological catching-up. The strong economic performance of New Member countries up to 2008 is certainly not related to growth of the knowledge economy, as these

countries (and their regions) have witnessed a weak performance in scientific indicators, both of input (R&D) and of output (patenting activity) (ESPON 2012). Of course, if some forms of technological or knowledge advancement had taken place, economic growth in these countries could have been more robust or continuous. But these advancements should not have taken the form of a traditional, generic investment in R&D, but rather the form of knowledge spillover generation from large multinational plants into the local fabric of SMEs, supported by public/private bargaining and agreements (the equivalent of the old-established practice of agreements on 'local content') and creatively utilized by local potential entrepreneurs;

(e) what is really meant by referring to the importance of local territories is the fact that, while some important production factors like financial capital, general information, consolidated technologies and codified knowledge are today readily available virtually everywhere, the ability to organize these factors into continuously innovative production processes and products is by no means pervasive and generalised, but instead exists selectively only in some places where tacit knowledge is continuously created, exchanged and utilized, and business ideas find their way to real markets (Camagni and Capello 2009).

For all these reasons, the translation of a sectoral policy—like innovation policy was intended to be, traditionally—into a regional spatial setting is not an easy task, and calls for a *territorial approach*, considering all the specificities of the single regions. The preconditions for knowledge creation, for turning knowledge into innovation, and for turning innovation into growth are all embedded in the territorial culture of each region. This means that each region follows its own path in performing the different abstract phases of the innovation process, depending on the context conditions: its own 'pattern of innovation', in our terminology.

On the other hand, following the RIS3 model, a dichotomous regional taxonomy emerges. In fact, the way in which the model suggests to target regions with different innovation policies leads to a simplified partitioning of the European research territory into a core and a periphery. Regions hosting high-tech sectors and top R&D activities are considered as 'core' regions, leading new knowledge creation and the transformation of the economy, drivers of Europe into the international technological competition. All other regions are assigned the role of adopters/adapters of technological frontier inventions into their 'knowledge domain', on the basis of their production specificities (Foray 2009; Foray et al. 2009; Giannitsis 2009; Pontikakis et al. 2009). But the ways in which knowledge may be created, acquired, utilised and transformed into innovation are far more complex when regional conditions are taken in full consideration.

As said before, the Commission's Report *Regional Policy Contributing to Smart Growth in Europe* (EC 2010b) shares this simplified vision of a twofold typology of regions. A similar typology, based on the intensity of knowledge produced locally, was recently proposed also by the OECD (2010, 2011), distinguishing 'knowledge

regions, industrial production zones, non-S&T driven regions'; similar doubts may be raised.

Other empirical research works on regional innovation, developed for the DG Enterprise and Industry (the *Regional Innovation Scoreboard*) and the DG Regio, end up with multivariate taxonomies of regions, going far beyond the dichotomous typology presented by the RIS3 model (JRC-Merit 2009; UNU-Merit 2010). Important and interesting results are achieved, but methodologies employed merge together indicators as diverse as innovation performance, knowledge inputs like R&D, sectoral structure, presence of spatial innovation enablers, with no clear conceptual expectations on the linkages among the different variables, in a purely inductive way. Our own goal, on the other hand, is to detect regional 'patterns' based on a clear conceptual definition of the different phases of any innovation process, and of the context conditions that are expected to support the different phases of the innovation process.

Still other approaches, even if coming from a regional science milieu, do not really accept the conceptual possibility of differentiation in regional innovation patterns. The Regional Innovation System (RIS) approach (Trippl 2010) claims that any RIS is constituted by two sub-systems: a sub-system of knowledge generation and diffusion (knowledge infrastructure dimension) and a sub-system of knowledge application and exploitation (business dimension), made up of the companies located in the region. It identifies local success conditions in the intense interactions and circulation of knowledge, human capital and resources within and between these sub-systems, for any type of regions. We see here a contradiction: even if regional specificities are considered, as embedded in the two subsystems, at the same time any RIS is supposed to need both subsystems, despite the variability in local capabilities, knowledge sources, knowledge intensity and typology of innovation. Our claim is that in some cases a sub-system of knowledge generation may be present, in some other not, and knowledge could be acquired from outside; for regions belonging to this latter case, the suggestion of developing and reinforcing the knowledge subsystem (Tödtling and Trippl 2005) looks somehow misplaced and it is probably not what their innovation mode requires.[3]

New thematically and/or regionally focused innovation policies require the identification of context specificities in the knowledge-to-innovation process, in a similar way as a 'place-based' approach is postulated for a renewed EU regional development policy (Barca 2009). To achieve such a goal, a theoretically, and empirically sound regional innovation taxonomy is required, to be tested on the European space.

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[3]If we do not agree with the idea of developing R&D facilities with the same intensity everywhere, for the same reasons we do not agree that knowledge sub-systems and the business sub-system have to be present everywhere with the same intensity.

16.4   Territorial Patterns of Innovation

16.4.1 An Operational Definition

Sound innovation policies should be linked to the characteristics of already established 'innovation patterns' in each region, defined in terms of the ways in which the different phases of an abstract innovation process are present, are performed and interlinked in reality. In fact, it is possible to consider alternative situations where innovation may build on an internal knowledge base, or on local creativity even in absence of local knowledge, or on innovative applications of a knowledge developed elsewhere and acquired via scientific linkages, or finally on imitative processes. In order to proceed in this direction, an operational definition of territorial patterns of innovation is needed: a territorial pattern of innovation is defined as a combination of *context conditions* and of *specific modes of performing the different phases* of the innovation process.

For what concerns the different phases of the innovation process, a logical sequence between knowledge, innovation and economic performance may be drawn as in the abstract but consistent 'linear model of innovation'—even if heavily criticized as unrealistic and rooted in the idea of a rational and orderly innovation process (Edgerton 2004). In fact, we strongly believe that: (1) in many cases scientific advance is a major source of innovation, as the ICT paradigm and trajectory indicate; (2) an alternative model of full complexity, where 'everything depends on everything else', does not help in conceptualizing and interpreting the systemic, dynamic and interactive nature of innovation; (3) self-reinforcing feedbacks from innovation to knowledge and from economic growth to innovation and knowledge play an important role in innovation processes. The impact of science on innovation does not merely reside in the creation of new opportunities to be exploited by firms, but rather in increasing productivity of, and returns to, R&D through the solution of technical problems, elimination of research directions that have proven wrong and the provision of new research technologies (Nelson 1959; Mowery and Rosenberg 1998; Balconi et al. 2010). We therefore strongly support the concept of a 'spatially diversified, phase-linear, multiple-solution model of innovation', in which the single patterns represent a linearization, or a partial block-linearization, of an innovation process where feedbacks, spatial interconnections and non-linearities play a prominent role.

For what concerns the *territorial specificities (context conditions)* that are behind each phase of the innovation process, we take advantage from the vast and articulated literature that takes territorial elements into consideration in innovation processes, namely:

– *concerning knowledge creation*: human capital and education in general, universities and R&D activities, presence of an urban atmosphere have been considered, in a variety of approaches, as the territorial preconditions for endogenous knowledge creation in the vast literature that was developed during the 1980s. In this period, innovation was interpreted as a production of high-tech goods or services, assuming an immediate link between invention and

innovation taking place inside individual firms (or their territories) operating on advanced sectors (Malecki 1980; Saxenian 1996). When many knowledge-based advances were actually introduced by 'traditional' sectors—such as textiles and car production—in their paths towards rejuvenation, it became evident that it was not only a matter of sectoral specialization, but of functional specialisation. Conceptual efforts were made to explain the different regional capacities in generating knowledge (MacDonald 1987; Massey et al. 1992; Monk et al. 1988; Storey and Tether 1998). Cities were identified as the most natural location of R&D and higher education facilities, taking advantages of urban externalities;

– *concerning knowledge diffusion and the role of 'proximity'*: in the 1990s, a new debate was launched on the way knowledge spreads within and between regions. Spatial proximity was at first seen as the main reason explaining the channels through which knowledge spreads around: moving in a certain sense back to the original contributions on innovation diffusion of the 1960s (Hägerstrand 1967; Metcalfe 1981), the pure likelihood of contact between a knowledge creator (an R&D laboratory) and a potential recipient (a firm, a university, another R&D centre) was seen as the main vehicle for knowledge transmission, in a pure epidemic logic (Acs et al. 1994; Audretsch and Feldman 1996; Anselin et al. 2000). The simplicity of this approach soon became evident, and a large debate was developed on the necessity to enrich the concept of spatial proximity with cognitive aspects, able to differentiate the absorptive capacity of different actors within regions;

– *concerning evolutionary paths of knowledge/innovation diffusion*: knowledge creation and innovation are described as the outcome of creative, evolutionary search processes implemented around existing competencies, inside specific domains or paradigms and along specific trajectories (Dosi 1982; Nelson and Winter 1977; Antonelli 1989; Foray 2009); as a result, the cognitive base of actors and organizations and their potential for learning differ substantially across space. In order to understand regional evolutionary processes, different concepts of proximity, from social to institutional, cultural and cognitive proximities, were added as interpretative elements in knowledge spillovers, enriching the conceptual tools interpreting knowledge diffusion (Boschma 2005; Rallet and Torre 1995; Capello 2009). In particular, Boschma interprets intra-regional cognitive proximity via the concept of related variety (Boschma 2005), while more recently a similar concept is employed to interpret cross-regional cognitive proximity and scientific co-operation potential (Capello and Caragliu 2012; Basile et al. 2012), as it will be shown later;

– *concerning knowledge utilization and receptivity*: the presence of entrepreneurship is another way of explaining an intra-regional capacity to translate knowledge into innovation. In this respect, the knowledge filter theory of entrepreneurship put forward by Acs and Audretsch envisages an explicit link between knowledge and entrepreneurship within the spatial context, where entrepreneurs are interpreted as the innovative adopters of new knowledge. This theory posits that investments in knowledge by incumbent firms and research organizations such as universities will generate entrepreneurial (innovation) opportunities because not all of the new knowledge will be pursued and commercialized by the incumbent firms. The knowledge filter (Acs et al. 2004)

refers to the extent that new knowledge remains un-commercialized by the organization creating that knowledge. These residual ideas are those that generate the opportunity for entrepreneurship. The interesting aspect of this theory is that the capabilities of economic agents within the region to access and absorb the knowledge and ultimately utilize it to generate entrepreneurial activity is no longer assumed to be invariant with respect to geographic space, contrary to what has been always thought. In particular, diversified areas, in which differences among people that foster appraising a given information set differently, thereby resulting in different appraisal of any new idea, are expected to gain more from new knowledge;

– *concerning innovation enhancing elements*: local interaction and co-operation in order to achieve reduction of uncertainty (especially concerning the behaviour of competitors and partners) and of information asymmetries (thus reducing mutual suspicion among partners); trust, sense of belonging, place-loyalty and social sanctioning in order to reduce opportunistic behavior, are all territorial elements, typical of the innovative milieus, that increase the capacity of a region to speed up innovation and take full advantage of collective learning processes (Camagni 1991), as confirmed by many regional economics schools (Bellet et al. 1993; Rallet and Torre 1995; Cappellin 2003).

The territorial innovation patterns concept stresses complex interplays between phases of the innovation process and the territorial context; by doing so, it adds three new elements with respect to the previous theoretical paradigms. First of all, it definitely separates knowledge from innovation as different (and subsequent) logical phases of an innovation process, each phase requiring specific local elements for its development. This approach refuses the generalization of an invention-innovation short-circuit taking place inside individual firms (or territories), as that visible in some advanced sectors, as well as the assumption of an immediate interaction between R&D/high education facilities on the one hand and innovating firms on the other, thanks to pure spatial proximity. Secondly, the concept of 'patterns of innovation' identifies the different necessary context conditions, both internal and external to the region, that may support the single innovation phases and that generate *different modes of performing and linking-up the different phases of the innovation process*. These context conditions become integral parts of each territorial pattern of innovation. The third new element concerns the overcoming of a purely geographic concept of proximity to interpret inter-regional knowledge spillovers, moving towards a concept of 'cross-regional cognitive proximity'. This concept links knowledge spillovers to the presence of a common technological domain inside which cumulative search processes and inventions can be performed through inter-regional co-operation (Capello and Caragliu 2012).[4]

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[4]Empirically, the common technological domain is approximated by a common specialization of pairs of regions into the same technological class (1 digit) of patents; potential for advancements is approximated by differentiation and complementarity in terms of specialization in sub-classes of patents (2 digits) (Capello and Caragliu 2012).

Among all possible combinations between innovation modes and territorial elements, the 'archetype' ones may be indicated in the following, each of which reflects a specific piece of literature on knowledge and innovation in space:

(a) *an endogenous innovation pattern in a scientific network*, where local conditions fully support the creation of knowledge, its local diffusion and transformation into innovation and its widespread local adoption. Given the complex nature of knowledge creation nowadays, this pattern is expected to show a tight interplay among regions in the form of international scientific networks. From the conceptual point of view this advanced pattern is the one considered by most of the existing literature dealing with knowledge-and-innovation creation and diffusion (Fig. 16.1);

(b) *a creative application pattern*, characterized by the presence of creative economic actors interested and curious enough to look for knowledge outside the region—given the scarcity of local knowledge—and creative enough to apply external knowledge to local innovation needs. This approach is conceptually built on the literature on regional innovation adoption/adaptation, as also proposed by the RIS3 model (Foray 2009; EC 2010b) (Fig. 16.2);

(c) *an imitative innovation pattern*, where the actors base their innovation capacity on imitative processes, that can take place with different degrees of adaptation on an already existing innovation. This pattern is based on the literature dealing with innovation diffusion (Fig. 16.3).

Conceptually speaking, these three patterns represent by-and-large the different ways in which knowledge and innovation can take place in a regional economy. Each of them represents a different way of innovating, and calls for different policy styles to support it. An R&D support policy can be extremely useful for the first kind of innovation pattern; incentives to co-invented applications, enhancing the ability of regions to change rapidly in response to external stimuli (such as the emergence of a new technology) and to promote upgrading of present specializations or shifting from old to new uses, is a good policy aim for the second pattern. The maximum return to imitation is the right policy aim of the third innovation pattern, and this aim is achieved through an adaptation of already existing innovations in order to reach particular market niches or specific territories.

As shown in the three figures, the complexity of the different patterns is much higher, and the territorial processes are much richer with respect to the apparently similar dichotomy proposed by the RIS3 model.

16.4.2 A Regional Innovation Taxonomy of European Regions

An empirical analysis has been performed on EU regions in order to identify whether and how the territorial patterns of innovation presented above actually exist in the reality. Based on a list of indicators able to cover all aspects of the
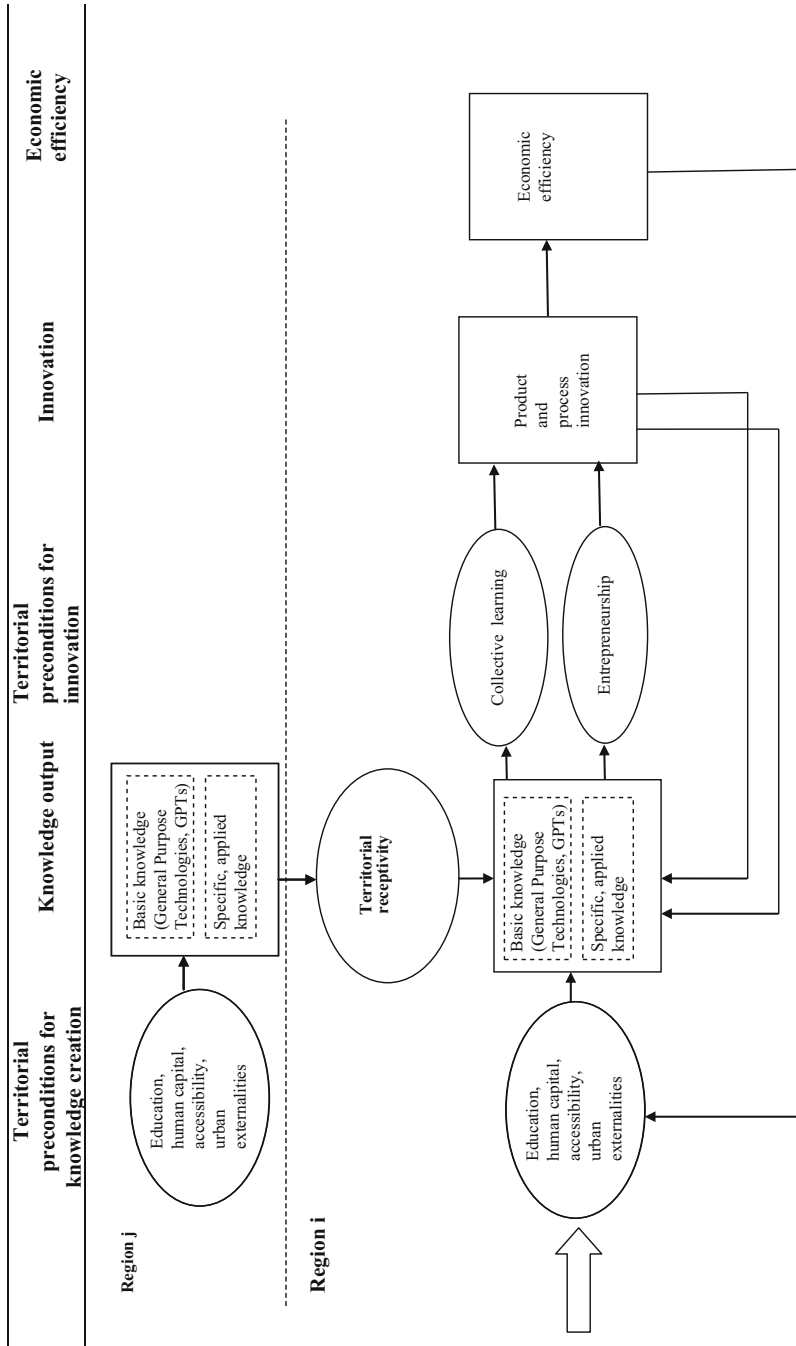
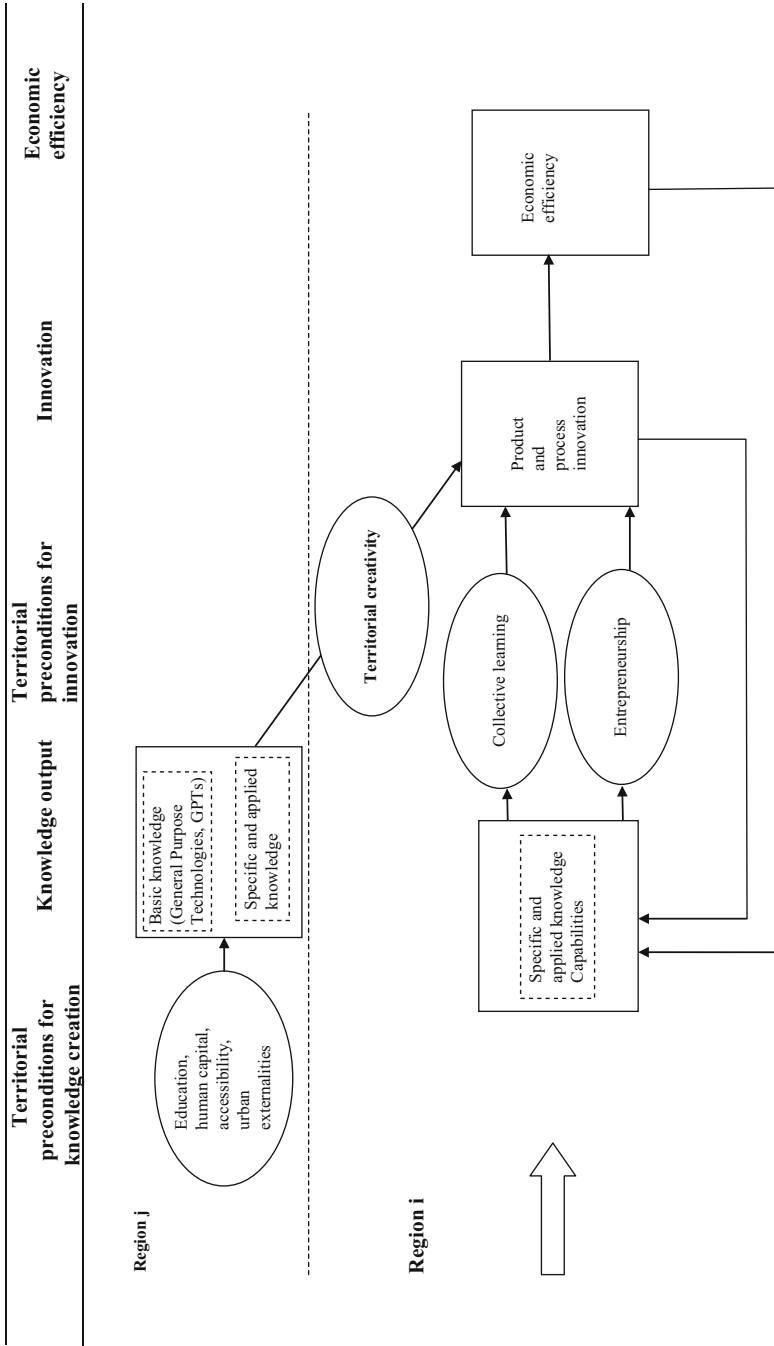**Fig. 16.1** Endogenous innovation pattern in a scientific network
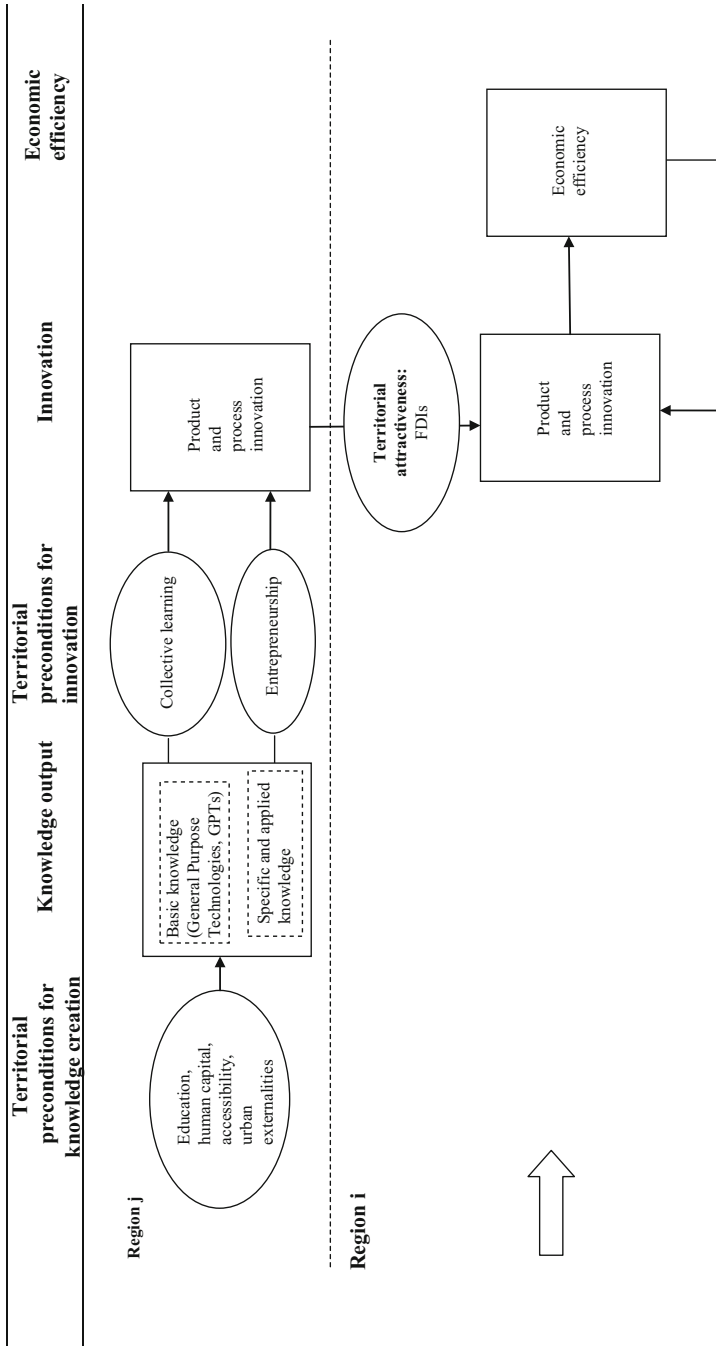
Fig. 16.2 Creative application pattern

Fig. 16.3 Imitative innovation pattern

complex knowledge-innovation chain and a newly built data-base on regional innovation performance (ESPON KIT 2012), a cluster analysis was run in order to identify the existence of innovative behaviours that could be associated to the territorial patterns of innovation previously described (Capello and Lenzi 2012).

The empirical results show a larger variety of possible innovation patterns than the ones conceptually envisaged, still consistent with the theoretical underpinnings presented before. Two clusters can be associated to our first conceptual Pattern depicted in Fig. 16.1, albeit with some relevant distinctions between the two; two clusters can be associated to the second Pattern depicted in Fig. 16.2, again with some important differences, and one cluster can be associated to the third Pattern. Interestingly, the five groups show sizeable differences in the variables considered in the clustering exercise, namely (Map. 16.1):

- *a European science-based area* (Pattern 1), characterised by regions with a strong knowledge base and fast innovation processes, specialized in general purpose technology, with a high generality and originality of local science-based knowledge and a high degree of knowledge inputs coming from regions with a similar knowledge base. R&D activity is high. These regions are mostly located in Germany, with the addition of Wien, Brussels, and Syddanmark in Denmark;
- *an applied science area* (Pattern 2), made up of strong knowledge producing regions characterized by applied science, with a high degree of knowledge coming from regions with a similar knowledge base. R&D activity is high in this cluster of regions too. These regions are mostly agglomerated and located in central and northern Europe, namely in Austria, Belgium, Luxembourg, France (Paris), Germany, Ireland (Dublin), Denmark, Finland and Sweden with some notable exceptions in Eastern countries (Praha, Cyprus and Estonia) and Southern countries (Lisboa and Attiki);
- *a smart technological application area* (Pattern 3), in which a high product innovation rate is registered, with a limited degree of local applied science and high creativity and receptivity which allow to translate external basic science and applied science into innovation. R&D endowment is much lower than in the previous two cases. The apparent target of this group of regions is to achieve specialized diversification across related technologies in diversified technological fields of competence. This group of regions includes highly urbanized regions in North-eastern Spain and Madrid, in Northern Portugal and Northern Italy, Lubliana, the French Alpine regions, in the Netherlands, Czech Republic, Sweden and the UK;
- *a smart and creative diversification area* (Pattern 4), characterized by a low degree of local applied knowledge, some internal innovation capacity, high degree of local competences, which suggest that the not negligible innovation
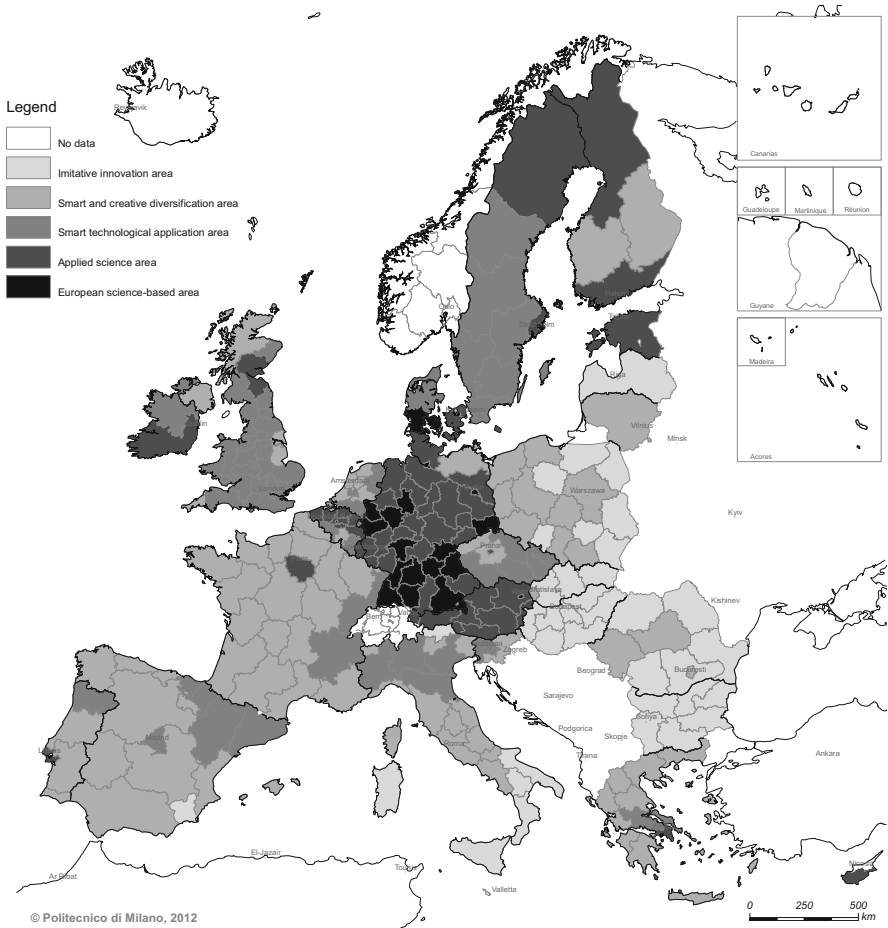
Map 16.1 Territorial patterns of innovation in Europe. Source: Capello and Lenzi (2012)

activities carried out in the area mainly rely upon tacit knowledge embedded into human capital. Moreover, regions in this area are strongly endowed with characteristics such as creativity and attractiveness that help to absorb knowledge and to adapt it to local innovation needs. These regions are mainly located in Mediterranean countries (i.e. most of Spanish regions, Central Italy, Greece, Portugal), in agglomerated regions in Slovakia and Poland, a few regions in northern Europe, namely in Finland and the UK;

– *an imitative innovation area* (Pattern 5), showing a low knowledge and innovation intensity, low entrepreneurship and creativity, a high attractiveness

of FDI and a good innovation potential. Most of these regions are in New Member Countries such as Bulgaria and Hungary, Latvia, Malta, several regions in Poland, Romania, and Slovakia, but also in Southern Italy.

These empirical results show that the pathways towards innovation and modernization are differentiated among regions according to local specificities. The variety of innovation patterns explains the failure of a 'one-size-fits-all' policy to innovation, like thematically/regionally neutral R&D incentives. Innovation patterns typical of each specific area have to be identified: on these patterns the smart specialization concept can find a sounder conceptual basis and more appropriate, targeted innovation policies can be drawn.

16.5   Towards 'Smart Innovation Policies'

The five—conceptually differentiated—innovation patterns detected by the ESPON Project KIT (Knowledge, Innovation and Territory) (ESPON 2012) and presented above may pave the way towards a renewed, spatially sound inclusion of the smart specialization strategy in R&D policies into an appropriate regional innovation policy framework, along similar lines of the Reform of the EU Regional Development Funds, explicitly intended—as a "key means of turning priorities of Innovation Union Flagship Initiative into practical action on the ground" (EC 2010b, p. 2). The logical pathway towards 'smart innovation' policies is drawn in Fig. 16.4.

'Smart innovation' policies may be defined as those policies able to increase the innovation capability of an area by boosting effectiveness of accumulated knowledge and fostering territorial applications and diversification, on the basis of local specificities and the characteristics of already established innovation patterns in each region.
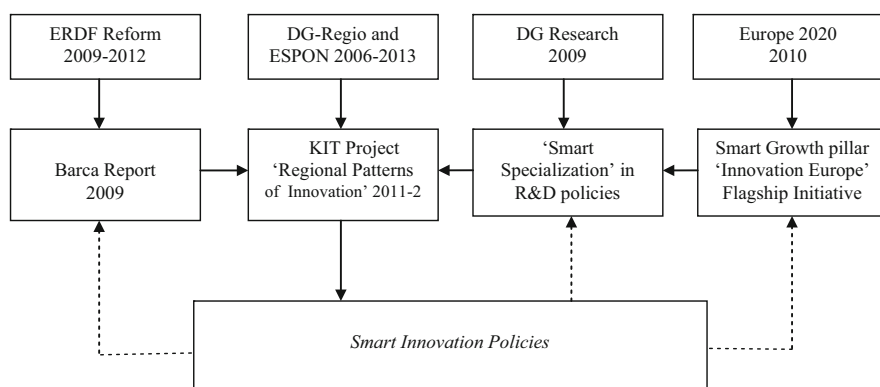
Fig. 16.4 Logical pathway and contributions to Smart Innovation Policies

The two key concepts of 'embeddedness' and 'connectedness'—put forward in the recent smart specialization debate—are a useful starting point. However, smart innovation policies adapt the two concepts to the specificities of each pattern of innovation, and look for ad-hoc interventions, appropriate for each single territorial innovation pattern, with the aim to reinforce the virtuous aspects that characterize each pattern, and increase each pattern's efficiency (Table 16.1).

This general policy strategy is by no means open to doubts or criticisms concerning the possible risk of locking-in regions into their traditional specialization, jeopardizing their specific resilience in a fast changing economic environment.[5] In fact, the smart innovation strategy assumes, in its application to each regional innovation pattern, an evolutionary attitude, targeting, suggesting and supporting local learning processes towards the detection of new needs, new creative applications and diversification of established technologies, new forms of blending knowledge advancements and local specialization, the discovery, and possibly the orientation, of future technological trends. Even 'jumps' over a different innovation pattern might be foreseen in some regional cases, even if, given the responsibility in the management of public money, policy makers should better stick to strengthening the upgrading and diversification processes inside each single innovation pattern—the least risky process, and the most likely successful one.

Regional innovation policies for each pattern should differ first of all in terms of policy goals:

(a) the maximum return to R&D investments is the right policy goal for regions belonging to the 'European science-based' and the 'Applied science' patterns, characterised by a sufficient critical mass of R&D endowment already present in the area. Regions belonging to these two innovation patterns can in fact exploit the indivisibilities associated to research activity and take advantage from additional R&D funding coming from joint and integrated efforts of regional, national and EU bodies. Given their different research specialization, the two patterns can reinforce their efficiency when innovation policies take in full consideration the regional research specificities: in the 'European science-based area' the maximum return of R&D spending is obtained through policy actions devoted to R&D spending in GPTs, and a strong specialization is fundamental to achieve a critical mass of research. On the other hand, applied scientific fields of research should absorb much of the R&D funds in the 'Applied science area', diversifying efforts in related sectors of specialization;

(b) support to basic research is not the most natural policy goal for the 'Smart technological application' and the 'Smart and creative diversification' patterns. In these areas the relatively low R&D endowment does not guarantee the presence of a critical mass of R&D in order to exploit economies of scale in knowledge production: returns to R&D of such kind of policy are modest.

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[5]A similar criticism was in fact addressed to the RIS3 strategy. See: Cooke (2009).

Table 16.1 Smart innovation policies by territorial innovation pattern

Policy aspects	Territorial patterns of innovation				
	European science-based area (Pattern 1)	Applied science area (Pattern 2)	Smart technological application area (Pattern 3)	Smart and creative diversification area (Pattern 4)	Imitative innovation area (Pattern 5)
Policy goals	Maximum return to R&D investments		Maximum return to applications and co-operation in applications		Maximum return to imitation
Policy actions for local knowledge generation (Embeddedness)	Support to R&D in: New basic fields General Purpose Technologies	Specialized technological fields Variety in applications	Incentives to technological development and upgrading Variety creation	Support to creative application, shifting capacity from old to new uses, improving productivity in existing uses, through: Identification of international best practices Support to search in product/market diversification Support to entrepreneurial creativity	Fast diffusion of existing innovation Enhancing receptivity of existing innovation Support to local firms for complementary projects with MNCs Support to local firms for specialized subcontracting
Policy actions for exploitation of knowledge spillovers (Connectedness)	Incentives to inventors attraction and mobility Support of research cooperation in: GPT and trans-territorial projects (ERA)	specific technologies and trans-territorial projects (ERA), in related sectors/domains; encouraging of labour mobility among related sectors/domains	Incentives for creative applications through: co-operative research activities among related sectors; co-operative search for new technological solutions	participation of local actors to specialized international fairs; attraction of "star" researchers even for short periods; work experience in best practice Knowledge creation firms of the same domains	Incentives for MNCs attraction bargaining on innovative 'local content' procurement by MNCs

Table 16.1 (continued)

Policy aspects	Territorial patterns of innovation				
	European science-based area (Pattern 1)	Applied science area (Pattern 2)	Smart technological application area (Pattern 3)	Smart and creative diversification area (Pattern 4)	Imitative innovation area (Pattern 5)
Policy style	Reach a critical mass in R&D activities through concentration of public support; priority to triangular projects by Universities-Research Centres-Enterprises; peer assessment of R&D research programmes; support to knowledge and technological transfer mechanisms to related sectors; thematical/ regional orientation of R&D funding:		Ex-ante careful assessment of innovation and differentiation strategies and projects; continuity in public support, subject to in-itinere and ex-post assessment of outcomes; support to bottom-up identification of industrial vocations, by raising awareness on local capabilities and potentials ('strategic industrial planning'); thematical/regional orientation of innovation funding, in order to:		Favour local spill-overs of managerial and technological knowledge from MNCs; support to co-operation projects between MNCs and local firms.
	in general purpose technologies	in specific fields of research and technological specialization of the area	strengthen present formal and tacit knowledge through co-operation with strong external partners in the specialization sectors	enhance local technological receptivity, creativity and product differentiation capability in specializ. sectors	support to technological transfer and diffusion
Beneficiaries	University, research centers, large local firms		Local firms	Local entrepreneurs	Local firms

Innovation policy aims in these patterns can be found in the maximum return to new applications and to inter-regional co-operation in applications, deeply linked to the ability of regions to change rapidly in response to external stimuli (such as the emergence of a new technology) and to realize creative search processes concerning product and market diversification.

To achieve such a goal, support to creative application, shifting capacity from old to new uses, improving productivity in existing uses, are the right policy tools for maximising the return to co-inventing application. In a word: support to 'D', and to co-operative 'D' rather than to 'R'.

In the first case (Pattern 3) policy actions for the achievement of such goals can take into account incentives to technological projects that foresee new and creative use of existing scientific knowledge; in the second case (Pattern 4), support and incentives to search in products/markets diversification and to entrepreneurial creativity look more appropriate;

(c) finally, in the 'Imitative innovation' area attention has to be devoted to the achievement of the maximum return to imitation, through fast diffusion of already existing innovation, strengthening of local receptivity to innovation (or reducing social/psychological or institutional barriers to change) and supporting favourable negotiations between local firms and MNCs on complementary projects and innovative, specialized subcontracting.

Beyond the previous policy recommendations aiming at fostering the creation of local knowledge, policy interventions should also aim at knowledge acquisition from outside the region, what has been called 'connectedness'. As for the case of embeddedness, also in this case implementation varies according to the specificities of the different patterns of innovation:

(a) in the first two patterns, the appropriate policy tools to attract external knowledge are incentives to inventors attraction and mobility, and support to research co-operation: in GPT and trans-territorial projects in the 'European science-based area', and in related sectors belonging to specific fields of technological specialization in the 'Applied science area'. This suggestion is in line with the creation of the European Research Area (ERA) put forward by the European Commission, an area composed of all research and development activities, programmes and policies in Europe which involve a transnational perspective. The 'Applied science area' could also be favoured by the encouragement of regional and inter-regional labour mobility between related sectors, which makes skills and experience moving around and blending with each other across sectors and regions;

(b) policy tools for knowledge acquisition in the third and fourth area are incentives for creative applications. For such a purpose, cooperative research activities in related sectors in those regions where a little applied science base exists are an efficient policy tool for the 'Smart technological application area'. On the one hand, participation of local actors to specialized international fairs, the attraction of "star" researchers even for short periods of time, or

support for work experiences in best practice knowledge-creation firms in related sectors are right incentives to stimulate innovation in the 'Smart and creative diversification' area whose innovation capacity lies in the brightness of local entrepreneurs to find outside the area the right applied science on which to innovate and move towards a specialized diversification in related sectors;

(c) the traditional incentives to attract MNCs remain the most efficient tool to attract new knowledge in areas with very limited—formal or informal, scientific or technical—knowledge. Traditional bargaining on 'local content' in MNCs' procurement could also be used, with enhanced attention to co-operation in specialized subcontracting.

The policies suggested require renewed styles in their design-to-delivery phases in order to enhance efficiency and effectiveness (Camagni 2008; Camagni and Capello 2011). As in more general regional development policies, a strong attention should be devoted to the following elements:

– transparency, which means clear justification of the spatial allocation of funds in the different measures, from spatial concentration in some cases (reaching a critical mass in R&D, particularly in Innovation Patterns 1 and 2) to spatial pervasiveness in others (tapping local creativity, diversification and adoption capabilities: Patterns 3 to 5);
– control on local strategies followed, in order to avoid rent seeking attitudes by local élites (in politics, in the economy, but also in the high education and research fields). This means favouring active co-operation among main local actors: universities, research centres and firms. The internal strategies of the single actors in the research and innovation fields, perfectly lecit, may not be the best ones for the entire regional community, or the most appropriate in terms of risk assumption by the public sphere; therefore, programmes and projects presented jointly by all three main actors should be solicited and given high priority (especially in Patterns 1 and 2);
– peer ex-ante assessment of main R&D and innovation projects presented to public support;
– knowledge transfer, knowledge diffusion through inter-sectoral and inter-regional co-operation and general knowledge dissemination should be favoured, in order to boost productivity of the publicly supported R&D;
– favour continuity over time in public support decisions—a crucial precondition for local learning processes—at the condition of fair and effective intermediate and ex-post assessment of outcomes;
– build a formalized, but flexible, organizational model for supporting the identification of regional specializations, in R&D and production, and for strengthening the search process of new thematic application fields and diversification areas, inside and outside the present technological and production domains: a local, participatory model that could be labelled as 'strategic industrial planning';

– favour creativity and entrepreneurial spirit in all regional conditions. This means, on the one hand, to detect and support present local skills, traditions, social values, positive attitudes towards the environment and local culture, solidarity and cultural diversity (especially in Patterns 3 and 4); on the other hand, to create an innovation-friendly business environment, reduce barriers or resistance to change, enhance receptivity to external stimuli and opportunities, discover new local potentials through the engagement of insufficiently utilised local resources (in Patterns 3, 4 and especially 5);
– favour the strengthening of local spillovers from large firms and MNCs present in the different regional contexts, in the field not just of technical knowledge and research potential but also in the field if production organization and managerial styles and practices, mainly through local subcontracting and co-operation with local firms.

New key-words, complementing embeddedness and connectedness, should be *justification* of the spatial allocation of funds, *tripartite co-operation* (universities, research centres, firms), *peer assessment* of R&D programmes and projects, *continuity* in public support subject to *in-itinere* control, tapping *creativity and entrepreneurial spirit*, informal but also lightly structured *local search* processes.

The 'patterns of innovation' taxonomy previously identified supplies precise rationale and potential operationality to the above-mentioned policy goals, actions and styles, assigning differentiated priorities to each regional condition in the knowledge-to-innovation process.

Beneficiaries of these policy recommendations differ among patterns. University, research centres and large R&D laboratories of private firms are the natural beneficiaries in Patterns 1 and 2—the 'European science-based area' and of the 'Applied science area. Local firms are the natural recipients in Pattern 3, namely the 'Smart technological application area'; entrepreneurs and small firms are the natural recipients of policies in the 'Smart and creative diversification area' (Pattern 4) and the 'Imitative innovation area (Pattern 5).

The previous policy suggestions are meant to increase the efficiency and effectiveness of innovation processes inside each single pattern. However, within each pattern, regions exist that are more advanced than others, and that potentially could move to a different pattern. For these regions, 'evolutionary policies' can be foreseen, devoted to the achievement of an upgrading of innovation processes.

Figure 16.5 shows the relative position of each pattern in terms of the elasticity of GDP to R&D, coming from a recent empirical analysis developed by the authors (ESPON KIT 2012). First of all, it shows how R&D activities require a certain critical mass in order to become effective; and this evidence supports the general suggestion concerning the necessary spatial concentration to R&D support, in the direction of already endowed area. Secondly, Fig. 16.5 represents the potential dynamic trajectories that the most efficient regions belonging to each Pattern could follow in order to achieve superior efficiency rates—and the associated policies supporting these trajectories.
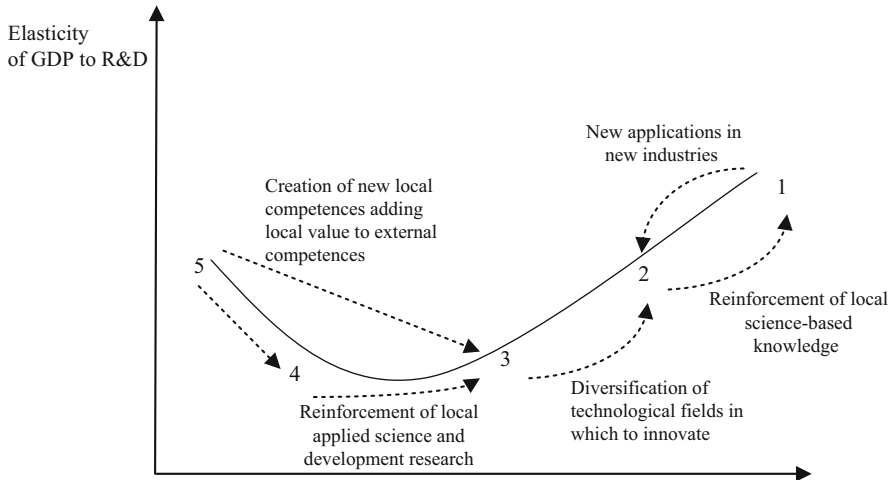
Fig. 16.5 Evolutionary trajectories and policies by patterns of innovation. Legend: *1* European science-based area, *2* Applied science area, *3* Smart technological application area, *4* Smart and creative diversification area, *5* Imitative innovation area

The most efficient regions in the 'Imitative innovation area' (Pattern 5) could jump either into a 'Smart and creative diversification area' (Pattern 4) or a 'Smart technological application area' (Pattern 3) through the creation of new local competence and entrepreneurial spirit, adding local value to external knowledge. The case study on the automotive industry in Bratislava, developed inside the empirical analysis (ESPON KIT 2012) is a telling example in this respect: following the creation of local suppliers with specific competences, main local innovation processes moved away from an imitative pattern, building on the knowledge that local subsidiaries and subcontractors had cumulated through strong interaction with the parent company. The innovation pattern in this area is increasingly approaching a 'Smart technological application' pattern (P3).

The most efficient regions in Pattern 4 could be supported in order to move towards Pattern 3 ('Smart technological application') through the reinforcement of local applied science and development research.

The 'European science-based area' (Pattern 1) could be stimulated to avoid some evidence on decreasing returns of R&D activities in terms of knowledge creation[6], by diversifying research into new application fields in new industries, merging aspects of the 'Applied science area' (Pattern 2). On the other hand, some regions belonging to the latter area could strengthen their science base in GPT fields, if already present with some critical mass, moving towards the first Pattern, namely the 'European science-based' one.

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[6]There is significant econometric evidence of decreasing returns of knowledge creation (patenting) to investments in R&D in European regions: see ESPON KIT (2012).

Finally, efficient regions belonging to the 'Smart technological application area' (Pattern 3) could overcome the low returns of R&D activities, limited to some tiny specialization sectors, by diversifying the technological fields in which to invest and innovate, acquiring some characteristics of Pattern 2.

Engagement in these kinds of 'evolutionary' strategies and policies should be carefully assessed and controlled, in order to avoid misallocation of public resources, backing impossible local dreams. In fact, this possible engagement requires: (a) the identification of the most efficient regions within each pattern; (b) the presence of some context precondition typical of the targeted pattern, and in particular of a sufficient critical mass in existing activities (R&D, technological knowledge, production know-how, managerial competences); (c) the presence of reliable (new) local actors, capable of managing new crucial functions; (d) the presentation of credible and well-assessed research and innovation projects. Only at these conditions would evolutionary policies find a fertile ground on which to produce virtuous effects.

If it is true that in some—textbook—cases innovation is the result of unforeseeable events, of totally unexpected creative 'jumps' and breaking-up of existing technological trajectories, it is also important to remind the systemic, complex and incremental character of the bulk of innovation processes, based on necessary slow, smooth and 'localized' learning processes. Therefore, it is rational to claim that regional innovation policies, managing public funds, should mainly stick to clearly defined innovation trajectories, based on existing context conditions and capabilities, presenting reasonable risks and the highest expected returns for the entire regional economy.

16.6 Conclusions

The present debate on regional policy design to fit the Europe 2020 Agenda calls for additional reflections on the way sectoral policies can be translated appropriately into a regional setting. In particular, policies addressed to the achievement of the *Smart Growth* goal have the evident problem of matching the sectoral dimension—knowledge excellence, R&D support, technological innovation—to the regional scale.

This paper is an attempt in this direction, and presents the rationale for a regionalised conception, design and delivery of innovation policies. If these policies have to support modernization and innovation processes in *all* European regions, they have to diversify their approach in order, first, to comply with the specificities and potentials of the single regions, and secondly to avoid the opposite risks of dispersion of public resources in un-differentiated ways, or conversely to concentrate all resources in a few regions where the traditional policy action, namely R&D support, is due to grant the highest returns.

In order to build 'smart innovation policies', the present regional models of innovation have to be identified, resulting from the different modes of performing the different phases of the innovation process—knowledge production/acquisition,

invention, innovation, growth—according to territorial specificities. In some cases, a policy of support to R&D can turn to be extremely useful, namely when a critical mass of research activities is already present, while it could produce no effect in regions where the path to innovations is not based on the development of an internal, formal knowledge base.

Five 'Patterns of Innovation' are conceptually and empirically defined in the case of European regions, going from cases in which the full 'linear' model of innovation—from R&D to innovation—is present to cases in which external knowledge is applied with differentiated local creative contributions to innovation, to cases in which innovation is mainly the effect of imitative processes.

The general concepts of embeddedness and connectedness, put forward in the recent debate on 'smart specialization', are right policy principles also for 'smart innovation policies'. However, these latter policies call for the adaptation of the two principles to the specificities of each Pattern of Innovation, and call for ad-hoc interventions with the aim of supporting, strengthening and diversifying the virtuous aspects of each regional innovation process.

Beyond the necessity to fully embed policy strategies into regional specificities through a bottom-up search process involving knowledge and project design capability of local actors, and to strengthen inter-regional co-operation in knowledge creation and transfer, new policy styles are requested by the new policy model. They refer to justification of the spatial allocation of funds and of differentiation of policy tools, tripartite co-operation between universities, research centres and firms in main R&D projects, peer assessment of R&D programmes and projects, continuity in public support subject to intermediate and ex-post assessment of outcomes, tapping creativity and entrepreneurial spirit, definition of informal but also lightly structured local processes of 'strategic industrial planning'.

Innovation policies should mainly operate inside each Innovation Pattern, intended as the natural and more likely successful way of supporting regional innovation processes. But in some special cases, some regions could be able to 'jump' over different and more advanced Innovation Patterns; 'evolutionary' policies could support these paths, with extreme attention and careful assessments, provided that context conditions and reliability of actors and strategies/projects could reduce risks of failure.

'Smart innovation policies', designed according to these principles and guidelines, could supply a conceptually and operationally sound answer to the need of renewed policy tools fit to attain the goals of *smart growth* and *Innovation Union*, consistent with the 'smart specialization' strategy proposed by DG Research and the necessary place-based reform of the EU regional policy advocated by the Barca Report and the recent documents of DG Regio.

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Rationale and Design of EU Cohesion Policies in a Period of Crisis

17

Roberto Camagni and Roberta Capello

17.1 Framing the Recent Debate on EU Regional Policies[1]

The paper builds upon the robust scientific debate on European cohesion policies which has taken place in the past decade and has been devoted to the necessary "paradigm shift" from a mainly redistributive logic, typical of the last century's approach, to a development logic (OECD 2001; Bachtler and Yuill 2001). The previous logic was mainly based on the presumed need to compensate lagging regions for the absence of some preconditions for growth—infrastructure, accessibility, education, health care—and to counterbalance the virtuous circles of agglomeration economies and increasing returns benefitting other "core" areas (Fernandez 2011). The new logic, led by generalized conditions of shrinking public resources and by the need to achieve overall spatial efficiency and competitiveness, mainly advocates endogenous development, continuous innovation and a growth perspective.

The debate has originated from three main considerations and empirical evidence substantially shared by all participants (Boldrin and Canova 2001; Rodriguez-Pose and Fratesi 2004; Percoco 2005; Bachtler and Gorzelak 2007; Gorzelak 2011; Barca et al. 2012):

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(a) the huge financial costs, the opportunity costs, and some significant unintended outcomes of the previous approach, which in many cases led to a syndrome of dependency on public support in lagging regions, generous remunerations to local élites and rent-seeking lobbies, and evidence of a low capacity to promote self-sustained growth in the long run;
(b) the evidence of a limited success of regional policies, perhaps not in helping regional transformations or responding to basic needs of the populations concerned, but certainly in achieving a convergence of GDP per capita and growth rates at the inter-regional level within individual countries (Boldrin and Canova 2001; Puga 2002);
(c) the new global context, which imposes on all countries, regions and firms a reshaping of locational patterns of production, new standards in economic efficiency and innovation capability, and new behaviors in managing technology, production cycles, information and finance.

As to be expected, in spite of the generalized agreement that a new development-oriented policy paradigm is necessary, the responses to the commonly-defined challenges in terms of policy philosophies and design have been highly diverse. On the one hand, a more market-driven and institutional approach has been proposed by two influential Reports (Sapir 2003; World Bank 2009) which implicitly (the first) or explicitly (the second) reject regional or cohesion policies as detrimental to aggregate macroeconomic growth and advocate institutional reforms mainly on labor markets, capital mobility and some basic infrastructure and accessibility policies. The World Bank Report fully endorses the New Economic Geography literature (Krugman 1991; Fujita et al. 1999; Belloc and Tilli 2013; Houglin Zhang 2014), pointing out the superior efficiency of large metropolitan areas and the need to support them for the sake of aggregate wellbeing. Market forces are no longer supposed to lead to a spatial re-equilibrium through the virtuous opposite movements of capital (towards lagging regions) and labor (towards large core cities), as in the early neoclassical literature on regional growth (Borts and Stein 1964): they are conducive to inescapable yet welcome economic disequilibria generated by the agglomeration economies achieved in a few large cities and by their leadership in innovation processes. The trade-off between aggregate efficiency and inter-regional equity hypothesized by the traditional regional policy literature is fully accepted, with favor openly expressed for the efficiency goal and "space-blind" policies (Gill 2011).

On the other hand, we find the long-standing position of the OECD (2001, 2009, 2011) and the influential Barca Report to the European Commission (Barca 2009) in favor of the opposite strategy: a "place-based" regional policy founded on place specificities and territorial assets, designed in a transparent and inclusive way by local actors with the support of external institutional and economic actors (multi-level governance) and subject to precise "conditionalities" imposed by the Union in order to prevent local rent-seeking and monopolistic practices. The main operational objective of the Barca Report is the production of "bundles of integrated,

place-tailored public goods and services" designed by "aggregating local preferences and knowledge" through participatory political institutions.

The opposite space-blind strategy supported by the World Bank is criticized as not being space-neutral: in fact, it favors large economic concentrations that are mainly the outcomes of non-market decision-making processes led by influential metropolitan and capital city élites (McCann and Rodriguez-Pose 2011; Barca 2011; Kim 2011). Even on recognizing the relevant role of agglomeration economies and the innovation potential of large cities, a world of megacities is not the only one possible. It is not the only efficient one, and it is by no means the most desirable one, given the contradictions and the social costs of a too spatially concentrated development pattern (Camagni 2001a; Henderson 2010; Camagni et al. 2014a). Furthermore, empirical evidence shows that, in terms of growth rates, large cities are not always and not everywhere the most successful places (Dijkstra et al. 2013; Parkinson et al. 2014). Equating large cities directly with economic success is to "confuse correlation with causality" (Barca et al. 2012, p. 141) and, what is even more detrimental, it means treating what may be a positive, factual observation as a normative statement, a guideline for policy action.

In the latter approach, the place or the local context is considered in a holistic manner encompassing economic, social, cultural, identitarian and institutional aspects. Neglecting these characteristics would mean forgoing full comprehension of the local development potential and the local limiting factors, the identification of potential development agents, and the potential synergies arising from the sense of belonging to a community. Even if an underdevelopment trap prevents a place from achieving any economic success, due to lack of capability or even the willingness of local élites to engage in a development effort, a space-neutral strategy avoids the problem, leaving people with the sole only option of outmigration (and the public administration with the burden of providing social assistance).

It is evident that two alternative policy paradigms confront each other, leading to opposite policy approaches: a national and mainly institutional intervention with no concern for territorial specificities, and a regionalized, bottom-up intervention concerned with local institutions and providing both a method for devising good and shared projects and financial support. In spite of some efforts to bridge the gap between the two approaches by representatives of both strategies (Gill 2011, on the one hand; Barca 2011 and Farole et al. 2011, on the other), with not fully convincing outcomes, they appear widely idiosyncratic and risk remaining, as in the past, the expressions of different political views.

What could be more productive in conceptual terms is demonstration that the long-standing supposed trade-off between "efficiency and equity" or, in more recent terms, between competitiveness and cohesion goals, may be overcome and prove non-existent insofar as a renewed cohesion policy—addressing the development potential of almost all "places" with new awareness and a new institutional sensitivity—could claim to achieve both goals at the same time.

One of the main aims of this paper is to support this last thesis, which is developed in Sects. 17.3 and 17.4. The other aim concerns inclusion in the policy

debate of the theme of the present crisis. While, as said before, the main driver of the new policy paradigm(s) has been the need to devise an appropriate response to globalization (and to the limited success of previous EU regional policy experiences), the profound and enduring crisis affecting many European and Western countries suggests new difficult questions: how can cohesion policies be justified in a period of crisis when short-term, anti-cyclical policies intended to boost internal demand may seem more appropriate than structural and supply-side ones? What space remains for cohesion policies when macro-economic policies impose strict controls on sovereign deficits and debts of countries? This question, addressed in Sect. 17.2, touches on an issue important for regional scientists: their overlooking of macroeconomic trends and constraints, mainly to do with demand elements (national fiscal policies, money supply and credit policies, exchange rates and the spatial effects of a common currency), because of their traditional concentration on supply and structural elements. Amid an enduring crisis, weaker or highly indebted countries encounter new and severe development difficulties as a consequence of austerity measures imposed by the Union, which are bound to have deep, though differentiated, effects on regions.

The crisis started mainly in the financial sector (pushing the real estate bubble up to the bankruptcy of many financial institutions), then hit the 'real' economy as a consequence of the global slowdown in demand, but then brought financial issues back to the fore, with the difficulties, costs, and risks generated by the financial speculation on sovereign debts and the need for tight fiscal policies. This obviously implies a much narrower path out of the crisis because: (1) public funds allocated to structural, long-term, objectives are limited and have to be more carefully justified and (2) a higher priority is assigned to the competitiveness issue, with the risk of de-balancing the above mentioned (and supposed) trade-off at the expense of cohesion goals.

More than before, a new justification and a renewed design of cohesion policies are required, which imply additional conceptual thinking backed by new empirical evidence. This paper is an attempt in this direction. The final section is devoted to suggestions on how to respond to the specific and particular challenges that the New Member countries of the EU are now facing, on the basis of the previous reflections.

17.2 Macroeconomic Conditions and Regional Disparities in the EU

Analysis of the impact of macroeconomic constraints on regional disparities is something new in the panorama of regional studies, and it warrants some in-depth reflection focused on the present crisis period.

Macroeconomic trends and policies are likely to generate asymmetric and differentiated regional impacts, especially in periods of financial turmoil and sluggish development, for many reasons. The first, and most straightforward, reason is in the fact that regions belong to different countries, and countries show a diversified resilience to economic downturns because of their different levels of sovereign debt,

different public deficits, and therefore different amounts of public resources available to be devoted to growth policies and regional support. Countries belonging to a monetary union have a further disadvantage because they cannot rely on the powerful policy tool—though risky and effective only in the short term—of devaluation of the currency. This implies further difficulties for countries experiencing a lack of economic competitiveness or an insufficient increase in internal productivity with respect to the other member countries. All this is responsible for some strong and well visible 'country effects' in the map of regional performances in Europe after 2007 (as will be shown later) and for the re-emergence of the role of national elements and specificities in the global development debate.

The second reason is more subtle and refers to more selective spatial effects. While supply-side elements, related to the structural characteristics of single areas and to the differing availability of territorial capital (Camagni 2009), are an immediate and logical explanation for the differentiated spatial impacts of the crisis (Gorzelak and Goh 2010), the same cannot be said of the demand-side, macro-economic elements that—at first glance—are not expected to generate asymmetric effects at regional level. And yet, they do.

Let us consider the most important macroeconomic effect of the financial crisis, namely the widening of the spread—the risk premium requested on public bonds with respect to riskless bonds—that hit many European countries in 2011–2012 as international markets associated a higher probability of default with large government debts coupled with poor growth capability. The increase in the spread in some problem countries—Italy, Spain, Greece, Portugal, Ireland—generated three, spatially selective, macroeconomic effects:

– a strong control on, and reduction of, public expenditure was imposed by the EU, with stronger likely effects on regions relying more on public demand because they are generally the poorer and less productive ones;
– private investments decreased as a consequence of the increase in interest rates on private loans and bonds, penalizing private actors, and particularly industrial regions with large shares of SMEs;
– a credit crunch came about as a consequence of the financial intermediaries' decision to prefer investing in public bonds rather than in the private sector, when sufficient guarantees existed against possible sovereign default; the real sector and the highly productive but financially fragile SMEs were hardest hit.

A temporal breakdown of the crisis period into different phases is necessary here. In the first phase 2007–2009, when the crisis was associated with real estate mortgage bankruptcy, negative regional effects were easily expected in the presence of financial activities directly or indirectly related to real estate, and of an hypertrophic and overvalued building and construction sector. In a second phase, 2009–2011, the crisis rapidly involved the real sector through the shrinking of global demand, which mainly hit export-oriented, industrial regions. In a third phase, 2011–2013, the crisis again hit the financial sector as a consequence of the international speculation on sovereign

debts of the above mentioned countries and the exposure of large financial institutions with public debtors. The credit crunch that followed extended the crisis from exposed sectors to residential ones (building and construction, commerce) and cumulatively hit internal consumption and demand for investments. Industrial regions joined the less developed ones in unemployment growth and loss of GDP potentials.

The overall outcome is a highly complex one. In all European countries, international, export-oriented regions have certainly suffered from the decrease in world demand, but if they could count on a strong supply structure they have been able to more easily recover. Peripheral and agricultural regions have been more protected against the decline in international trade but, at the same time, they have suffered more from a weak and less flexible supply structure, unable to react to the structural changes brought about by the crisis, relaunching their dependence on public transfers and support.

Regional forecasting models, well structured in order to include both regional supply-side assets and national, demand-side macro-economic elements, could assist in disentangling the different logical chains leading from macro-economic constraints to regional impacts in the recent past, and in building an ex-ante picture of the likely macroeconomic trends out of the present crisis and their regional distribution. A recent simulation exercise has been carried out in the ESPON - ET2050 project, based on a model of this kind, called MASST (Capello 2007; Capello et al. 2008, 2011b). The last version of the model, MASST3 (Capello et al. 2014) warrants particular attention since it is particularly suited: (1) to measuring the costs of austerity and growth measures, and their interactions and feedbacks, in periods of both crisis and economic expansion; (2) to interpreting the heterogeneous regional effects that the economic downturn and the subsequent expected recovery are likely to generate.

The results of the 'Baseline' scenario are presented in Map 17.1 in terms of annual average regional GDP growth rate in the 2012–2030 period. The scenario was developed under the assumptions that present restrictive fiscal policies will not be relaxed (keeping the present 3% of allowed yearly deficit over GDP), that the existing monetary tools in the hands of the European Central Bank will continue to discourage international financial speculation, that no new policy tools (like Eurobonds) will be implemented, that cohesion policy budget will be maintained at present levels, and that the crisis will end starting from 2015 to 2016.

The model's conditioned forecasts ('foresights') show that GDP growth will be positive in all European regions, with the exception of a very limited number of regions in southern Europe. Moreover, in terms of GDP growth rate, a two-speed Europe appears, since regions belonging to southern countries grow in general significantly less than northern countries. Finally, the convergence process by New12 countries remains incomplete: Eastern European countries still grow more than the others, but not enough to catch up with the GDP per capita levels of the Western countries by 2030.

These simulation results confirm that the crisis has permanent effects, and considering the business-as-usual nature of the simulated scenario presented here, they demonstrate that the 15 post-crisis years (2016–2030) are not sufficient fully to counterbalance the negative trend experienced in the years of crisis (2008–2015). In fact, the results point to a striking persistence of the relative slowdown of
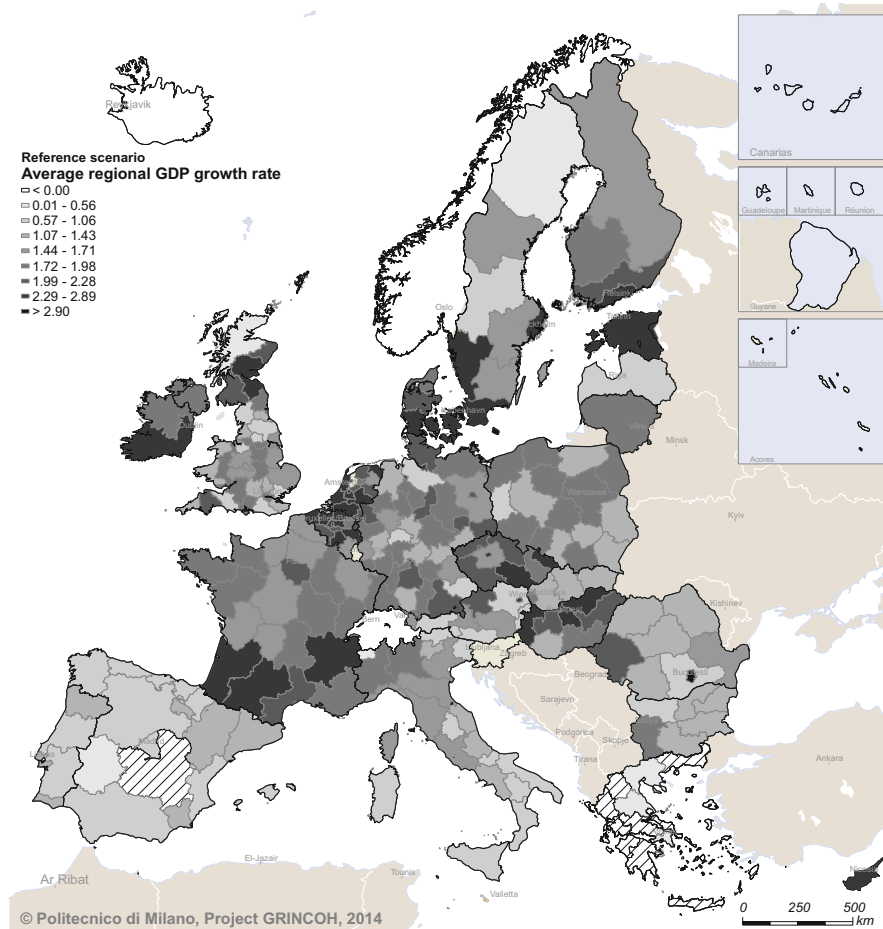
Map 17.1 Trends in competitiveness of CEECs (Real effective exchange rates, 1994–2012; 2004=100). (**a**) Bulgaria, Czech Republic, Hungary, Poland, Romania, and Slovakia, (**b**) Estonia, Croatia, Latvia, Lithuania, and Slovenia. Source: Authors' calculations on Eurostat data

Mediterranean countries with respect to Central and Northern ones. This also holds for some peripheral areas in Spain, and especially in Greece, where an even negative (although modest) GDP growth rate is maintained for the simulation period, as a result of both out-migration and poor productivity performance. Greece seems to be paying the direst cost in this scenario, and in the absence of more expansive policies, most Greek regions would not fully recover from the current contraction of investment and consumption.

This simulation exercise conveys a first important message. In the absence of policies able to correct the current imbalances, the growth engine appears unable to overcome the damage caused by a long period of downturn.
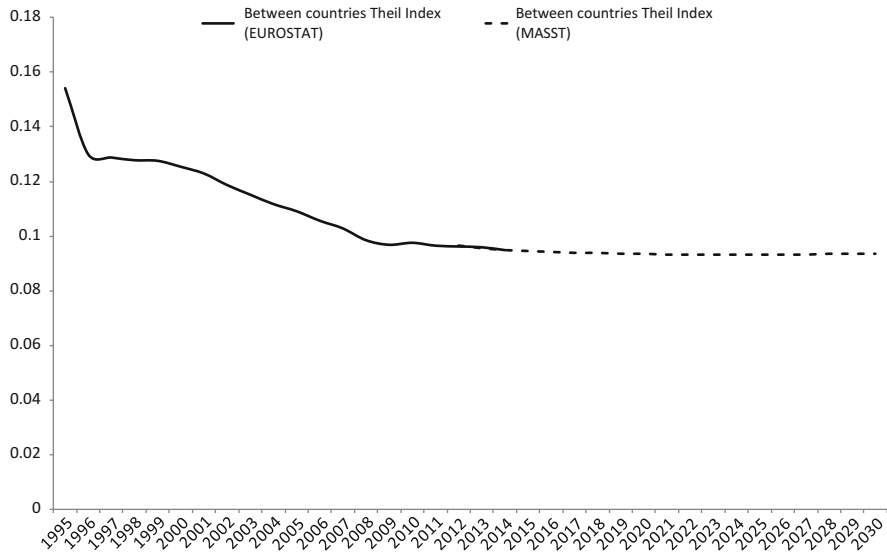
Fig. 17.1 Average annual regional GDP growth rate forecasted by the MASST3 model, baseline scenario, 2012–2030. Source: MASST3 results (ESPON ET2050 Project)

This is not all. Inspection of the spatial imbalances caused by the crisis shows that the lack of adequate development policies risks jeopardizing two decades of efforts towards EU enlargement and cohesion. On looking at between-countries disparities in GDP (Fig. 17.1), where the values of the Theil index are plotted for the period 1995–2012 on official statistics and then up to 2030 on modelling forecasts, it is quite evident that the long-run convergence process was interrupted during the crisis, and that it is likely to slow down substantially from now on. Its sluggish pace will be insufficient to counterbalance the forecasted increase in within-countries disparities (that was also observed in past decades), so that the index of overall regional disparities is expected to increase from now to 2030 (Fig. 17.2). The dual process of inter-national convergence slowdown and of regional concentration implies a greater challenge to future cohesion policies.

17.3 Main Challenges and Justification for a Renewed Regional Policy Strategy

Owing to the increasing difficulties that territorial approaches to development encounter nowadays, refreshed theoretical reflection on the economic rationale for a territorial approach to development is in order. This rationale may be found in the following elements:

(A) in a context of international integration, especially in the earlier periods, market forces determine a concentration of activities and an increase of
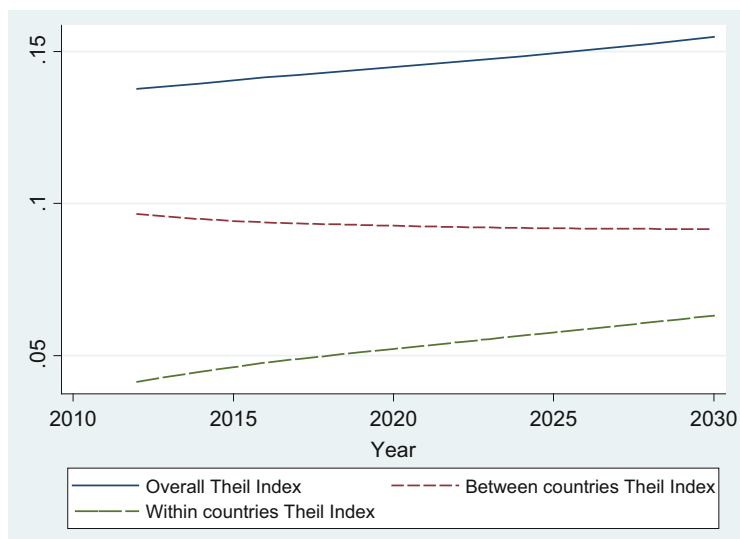
Fig. 17.2 Convergence interrupted: past and expected inter-national disparities in the EU. Theil index 1995–2030. Source: Authors' elaboration (EUROSTAT and ESPON ET2050 Project)

regional disparities (Williamson 1965). This is due to the cumulative nature of development processes in macroeconomic and microeconomic terms (increasing returns to scale at the firm and urban level, in-migrations and widening of internal markets; cumulative technical progress) (Myrdal 1957; Krugman 1991; Fujita et al. 1999) and the limited capacity of spontaneous adjustment processes to rebalance differentiated regional starting conditions and underdevelopment traps (Capello 2007, Chap. 4; Barca 2009). In presence of the new challenges of a globalizing world, these processes are enhanced by the higher resilience and reaction capability of stronger regions.[2] Are these spontaneous trends an acceptable or a desirable condition?;

(B) the absence, in an inter-regional context, of certain powerful macroeconomic adjustment mechanisms that work at the level of countries (devaluation of currencies, flexibility of prices and wages) and that are able to guarantee each country a role in the international division of labour, according to the well-known Ricardian principle of comparative advantage. These mechanisms and policy tools are not present at the regional level, and whenever a region has lower rates of productivity growth with respect to other regions or other

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[2]Until the beginning of the present crisis, for more than two decades the convergence of regional GDPs in the EU was due to the catching up of weaker countries, not to a reduction of inter-regional disparities within the single countries. During the crisis, a slowing catching up process by the new Eastern member states and the deep crisis of many southern European countries was not of an extent to counterbalance the general increase in within-countries disparities (as shown before). See: Boldrin and Canova (2001) and Puga (2002).

structural deficits (e.g. in accessibility), its fate is out-migration and even, at the extreme, 'desertification'. All this can be summarized in the statement that regions compete according to a Smithian principle of 'absolute advantage', not to a Ricardian principle of 'comparative' advantage (Camagni 2002), and it confirms that the trend towards increasing disparities within each country is the most likely outcome;

(C) the evidence of huge economic costs of non-intervention in a context of increasing disparities and globalization provides even clearer support for spatial development policies. A strategy of non-intervention, in fact, has the following drawbacks (OECD 2001, Chap. 1; Camagni 2001b):

- the risk of a super-concentration of population and jobs in advanced regions and cities, with high risks of inflationary pressures. This happened in many EU countries after joining the Union: Italy in the early 1960s, Spain in the 1990s; Ireland in the 2000s; the New Eastern Member Countries in the mid-2000s;
- the high opportunity cost of adding new activities in already successful areas. In a context of full employment, new workers for new activities are found at the expense of existing activities—therefore, at a cost—while in weak areas, characterized by high unemployment, they are drawn from the unemployment reservoir, and their opportunity cost is close to zero;
- the high social costs of migrations, which represent both a barrier to regional adjustment—particularly in countries with historic local traditions and between countries with different institutions and language (Cheshire 2011)—and a drawback in social terms (Barca et al. 2012), especially when lagging areas encompass millions of people[3], although they are difficult to assess;
- the channeling of a large share of national savings into the building and construction industry and real estate speculation in advanced regions and cities, as a consequence of migration processes and possible building bubbles, subtracting those savings from more productive uses;
- a lower exploitation of the creativity potential of all regional communities constrained by the presence of some basic locational disadvantages and underdevelopment traps (accessibility, services, infrastructure, unsuitable local élites).

Other justifications can be proposed in favour of cohesion policies, and they refer to the fact that 'territory matters' in the development process (OECD 2009). In fact:

(D) globalisation has brought to the fore the growing importance of spatial proximity, not in the sense of its being a shelter to the benefit of local markets and communities but in the sense of the growing importance of local conditions for global economic success—the so-called 'localisation' issue. Territories not

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[3]Like the Italian Mezzogiorno, with more than 20 million inhabitants.

only supply the infrastructure and service preconditions for successful location decisions and the skills and competencies needed for economic growth, but they represent a crucial stock of non-mobile social and 'relational' capital. These assets are crucial because they may counterbalance the apparent 'hyper-mobility' of some other, globalised production factors, like financial capital (OECD 1999);

(E) the increasing importance of knowledge factors, of non-material elements linked to culture, taste and creativity in present economic processes is deeply embedded in slow, localized learning processes fed with information, interaction, long term investments in research and education. These new and more qualitative aspects of the present international economic picture make space, or better 'territory,' enter the economic development scene as a key player. Learning processes are inherently localised and cumulative because they are embedded in human capital, interpersonal networks, specialised local labour markets and local innovative *milieux* (Camagni 1991; Camagni and Maillat 2006);[4]

(F) sense of place, local trust and synergies, social and relational capital may be seen as public goods (Bolton 1992) supplying local societies with the 'glue' and the 'gas' that they need to engage in fruitful participatory processes, collective actions, and design of potential development strategies (Storper 1995), through more or less formalized processes of strategic development planning and trans-territorial networking. These processes, in their turn, can enhance and reinforce the initial social capital giving rise to a cumulative and virtuous cycle favoring local co-operation and innovation processes (Rodriguez-Pose 1999; Iammarino 2005; Rodrik 2005). A centralized, top-down and space-blind policy approach completely overlooks the importance of these context processes, limiting the possibility to use local knowledge and capabilities in the interpretation and exploitation of local economic potential, to create the necessary local consensus for policies, to select and provide the necessary amount of local public goods, to force local actors to take responsibility for the design, implementation and (co-)financing of local development projects (Bolton 1992; Tabellini 2010; McCann and Rodriguez-Pose 2011);

(G) general institutional conditions operating at the national level are crucial. For instance, we can think of factors such as the regulation of the labour market, market transparency and risk control in financial markets, market openness (antitrust practices), fiscal homogeneity (across countries), etc. However, as shown by Armstrong and Taylor (2000), spatial characteristics and local and regional institutions also play a major role in speeding up or hindering the economic transformation process, with the consequence that they should be

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[4]We see here a complex dialectic between the hyper-mobility of some production factors and the territorial 'anchorage' of some others, which act as crucial location factors for the more advanced production processes. The likely result is the cumulative strengthening of the centripetal forces of growth (scale and scope economies, all sorts of increasing returns) and the centrifugal forces of territorial exclusion and decline.

attentively considered by regional development policies. The Barca Report (2009) confirms the centrality of these local institutional elements, adding the political power of local élites that in many cases are not just unable but also, and especially, unwilling to engage in innovative processes and to renounce their rent positions;

(H) spatial policies traditionally found their justification in the evidence of multiple cases of 'market failure' in the allocation of resources (spatial and land resources, physical and financial capital resources, etc.) in a general framework of static optimization. Nowadays, after radical economic transformations in most of the world—from agriculture to industry, to tertiary activities, to information, knowledge and control activities—the general framework is one of dynamic optimization, requiring the ability to provide the conditions for the rapid transformation of local economies and for a quick transfer of resources from declining to 'sunrise' functions (Camagni 2001b). A new crucial task is therefore assigned to regional development policies, in each and every location;

(I) finally, the restrictive macroeconomic and fiscal policies imposed on highly indebted countries exert an influence on regional disparities, as was shown in the preceding section. In addition, weaker countries belonging to a monetary union inescapably act on international markets with an adverse exchange rate resulting from the strength of other countries' trade balances. In the case of the European Union, these conditions call for major macroeconomic readjustment in the direction of a federalist union granting more resources and more autonomy not just to countries but also to regions.

17.4 Competitiveness vs. Cohesion: A Traditional and Possibly Outdated Trade-Off

Social and economic cohesion (in other words, 'equity', as it was called in previous decades) is one of the main political goals of any society, and it was authoritatively assumed as one of the founding principles of the European Union. Recently, however, another goal, namely 'efficiency' or aggregate 'competitiveness', has become increasingly prominent, as a consequence of increasing global integration and tight limits on public fiscal policies and debts. Yet the relationship between the two goals has never been explored in depth: a clear trade-off has often been hypothesized and the positioning on this equity/efficiency trade-off has been felt to be the main task of the political sphere. But further theoretical reflections have questioned the very existence of this trade-off, emphasizing both the aggregate development effects of sound spatial development policies and, on the other hand, the economic and social costs of an unbalanced development process, as illustrated in the previous section (OECD 2001, Chap. 1; Camagni 2001b). Many of these reflections could be worth reconsidering: if regional policy finds a strong rationale and justification not on equity grounds alone, its relation with, and the widely

assumed opposition to, economic development policy should be carefully reconsidered.

The trade-off between competitiveness and cohesion, or between efficiency and equity, is by no means a new theme; in fact, it has always characterized the European scientific and policy debate, leading to opposite views on the best policy strategy (Armstrong and Taylor 2000; Capello 2007). A strategy favouring the highest returns on investments in core and 'champion' areas, in order to achieve the highest aggregate growth rates and obtain the highest fiscal revenues on which redistributive policies can rely, has often been conceptualized as the most appropriate one, especially in periods of general crisis (Sapir 2003; World Bank 2009). The opposite strategy, oriented towards support for lagging regions, was traditionally advocated mainly for social equity and cohesion reasons, but more recently also on the grounds of its contribution to growth, when the competitiveness of these regions has been taken as its main target (EC 2005, 2008, 2009; Barca 2009).

The key driver of the crucial turn ("a new economic policy paradigm?": OECD 2011, p. 15) was the concept of territorial capital, intended as the ensemble of geographical (accessibility, agglomeration economies, natural resources), economic (factor endowments, competences), cognitive (knowledge, human capital, cooperation networks), social (solidarity, trust, associationism), and cultural assets ("understandings, customs and informal rules that enable economic agents to work together under conditions of uncertainty" (OECD 2011, p. 15) that represent the competitive potential of places (Camagni 1991, 2009). "This territorial capital generates a higher return for certain kinds of investments than for others, since they are better suited to the area and use its assets and potential more effectively" (ibid., p. 16), a sentence replicated by the *Scoping Document and Summary of Political Messages* of the European Commission, approved under the Luxembourg Presidency in 2005. The document concludes that "Territorial development policies (policies with a territorial approach to development) should first and foremost help areas to develop their territorial capital" (European Commission 2005, p. 1).

That modern spatial development policies should be designed so as to maximize the collective returns to public investments is an idea both correct and widely shared. However, this goal is not necessarily reached through investments in strong areas, but rather through the ability of individual policies to mobilize geographically dispersed, previously 'untapped' assets of territorial capital, and use them in the most efficient ways possible. The aggregate development effects will in this way be maximized, and at the same time the economic and social costs of an unbalanced development process kept under control.

Centralized, top-down development strategies which overlook regional specificities explicitly forego supporting and exploiting the strategic capabilities of the intermediate institutional bodies, both public and private, that are present in dispersed manner in all territories—repeating in a different context the limits of centralized planning habits stigmatized by Friedrich von Hayek (1978). These decentralized bodies are the best fit for interpreting the potential assets present in each territory and for generating, through a bottom-up 'discovery' process, the agreement on necessarily differentiated and 'place-based' development strategies

(provided that the right incentives, rules and control systems are delivered from the centre) (Coffano and Foray 2014).

The suggestion of policy design driven by the needs and based on the specificities of each territory is in line with recently-proposed new policy concepts like constructing regional advantage (European Commission 2006; Asheim et al. 2011), platform policies (Harmaakorpi 2006; Cooke 2007), place-based development (Barca 2009) and smart specialization (Foray et al. 2009, 2011; Morgan 2013). Although there are differences among these various policy concepts, they concur in pointing out that each region hides its own growth potential in its specific industrial and institutional past, its capital assets; and that it is the task of local stakeholders to build strategies and design appropriate projects to be supported by the EU regional policy (Boschma 2014).

The need for place-based policies is strongly felt in the field of innovation policies. Traditionally devoted to achieving a 'smart growth', and therefore inevitably investing mainly in strong areas, innovation policies have been recently forced to move away from the previous conceptualization in favour of a differentiated strategy tailored to regional specificities (Coffano and Foray 2014; McCann and Ortega-Argilés 2014).

More specifically, these specificities should be found in how the innovation process is implemented in each region, given that the preconditions for knowledge creation, for turning knowledge into innovation, and for turning innovation into growth are unevenly distributed in space and embedded in the differentiated cognitive cultures of regions (Capello and Lenzi 2013). This means that each region follows its own path in performing the various abstract phases of the innovation process depending on the context conditions: its own 'pattern of innovation' (Camagni and Capello 2013; Camagni et al. 2014b). If this is the case, two conceptual consequences ensue: first, a single overall strategy of support for R&D is unlikely to provide the right stimuli and incentives in the different contexts; and second, the aggregate growth rate is maximized when policies are tailored to local innovation patterns and not directed towards most promising 'scientific' regions alone.[5]

Inference analysis has shown that a substantial impact of R&D on GDP is achieved only in those clusters of regions where a critical mass of R&D activities is present; but also that other patterns of innovation, less intensive in local knowledge, may generate very successful innovation processes and high growth rates, even higher than those of many 'scientific' regions (Foddi et al. 2013).

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[5]Europe is characterized by a large variety of innovation patterns that range from a purely 'imitative' innovation pattern to a 'science-based' pattern built on a strong local knowledge base, high R&D investments on general purpose technologies and a high degree of knowledge interactions with other complementary advanced regions. Identified in between these two extreme patterns have been an 'applied science' area with strong applied R&D activity and still intense external cooperation; and a 'smart technological application' area, with fast product innovation processes, a limited degree of local applied science and a high creativity and receptivity allowing the successful translation of external basic and applied science into innovation (Capello and Lenzi 2013).

These new research findings prove that even in the case of policies traditionally considered as 'excellence' ones, like R&D and innovation policies, investing only in core, already competitive regions may not be the best strategy for maximizing aggregate growth. If it is true that R&D support should be very selectively directed towards science-based regions, it appears also crucial that other innovation strategies be devised and supported in regions operating within other innovation 'patterns', e.g. enhancing inter-regional cooperation in knowledge applications or mobility of researchers, or favoring the utilization of more advanced technologies in traditional specializations. In this way, both growth and cohesion goals may be achieved.

The recent renewed delivery strategy of the EU regional policy embracing a place-based and smart specialization philosophy, and recognizing the differentiated potential development and innovation paths of European regions, implicitly recognizes the superseding of the hypothesized trade-off between efficiency and equity goals (European Commission 2008, 2009). All types of regions and urban systems can potentially contribute to aggregate economic growth whenever they are able to follow their most appropriate and specific development and innovation paths and properly exploit their territorial capital resources (Garcilazo et al. 2010; OECD 2011). "From this perspective, the economy as a whole can reach its total output frontier by developing places of different sizes and densities, because it is the performance of the urban and regional system as a whole which is critical, rather than just the cities at the top of the urban hierarchy" (Barca et al. 2012, p. 140).

The opposite view, according to which only megacities are drivers of growth—on the basis of a stylized and simplified model explaining the well-known existence of agglomeration economies, a model assumed as a key component of 'the new' location theory, too simple to be taken as the basis for spatial development policies—seems untenable. Once the "paradigm shift" from inter-regional compensation to growth and innovation-enhancement has been properly operationalized and cohesion/innovation policies have been carefully inspected and reoriented, the trade-off disappears and confirms its nature as an outmoded conceptual tool.[6] Doubts about the fact that "excessive equality may be detrimental for economic growth", about the "potential trade-off involved in pursuing goals of growth and innovation and those of convergence and equity" or "between aggregate efficiency and promoting convergence" (Farole et al. 2011, pp. 1095–1099) should be abandoned, and replaced by new reflections on the proper implementation of the new paradigm.[7]

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[6]Perhaps, following Williamson (1965) we could accept that in early periods of integration into a wider pool of countries at differentiated development stages, for lagging countries could be wise to back and support natural concentration trends, e.g. providing new infrastructure in core regions and main cities. But very soon the contradictions of a too spatially concentrated pattern are due to manifest themselves, and the opportunity costs of leaving idle resources untapped will become evident.

[7]Stating that "objectives of addressing underdevelopment in a growth-enhancing way be sharply distinguished from convergence policies" (Farole et al. 2011, p. 1101) looks at odd with the illustrated paradigm shift advocated in this and other papers. Inter-regional convergence in Europe was always very difficult to achieve, but: (a) this does not mean that convergence should not be pursued, with the appropriate tools and strategies; (b) convergence is only one indicator among

Another evidence, coming from all successive enlargements of the EU towards relatively lagging countries, shows that allowing a huge and sudden concentration of development in just a few core areas is conducive to rising wage levels well beyond increases in productivity and consequently on prices—jeopardizing competitiveness of the entire countries, due to the role of these areas as main labour markets and goods markets: these were the experiences of Italy, Spain, Portugal, Eastern countries—and also risks to boost real estate bubbles—the Irish case after 2000s. This drawback in the long run may become a structural contradiction, as already mentioned in Sect. 17.3 (C).[8]

Direct, though not decisive, evidence that an appropriate and smart design of regional policies could overcome the dilemma between competitiveness and cohesion was reached in the already-mentioned ESPON project (ESPON ET2050 2013) concerning the construction, quantitative simulation and assessment of territorial scenarios for the EU. Three 'exploratory' scenarios were built, beyond a baseline one, namely:

– a 'Megas' scenario, a typical market-driven one implying a concentration of investments in European large cities, with a welfare system fully privatized and strict requirements on national public debts;
– a 'Cities' scenario, implying a concentration of investments on second and third-rank cities, the actual welfare system reinforced through increased taxation, lower requirements on public debts and a constant budget for cohesion policies;
– a 'Regions' scenario, in which public resources are mostly devoted to social and development policies in lagging, rural and peripheral regions, a strong public welfare system persists at the expense of public financial debts, slowly repaid, and the EU budget for cohesion policies is increased.

The first and the third scenarios can easily be interpreted respectively as rather extreme and traditional competitiveness and cohesion scenarios. The 'cities' scenario, instead, embraces the philosophy of supporting medium and medium-large cities, which are widespread in Europe and represent potentially productive areas rich in specific, not fully exploited territorial capital assets and unexploited agglomeration economies: it may be seen as an intermediate scenario, seeking at the same time to enlarge development beyond large cities in relatively advanced regions and to pick the relatively better structured areas, namely urban areas, in lagging regions.

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others concerning the achievements of the cohesion goal—economic, social and territorial (art. 3 of the Treaties)—, to be intended as a more equilibrated and equitable presence of diversified development trajectories across regions.

[8]These examples prove that governing these contradictions, both in the short-term and in the long-term, is rather difficult, and that even the availability of public resources for limiting the main drawbacks in core areas can reach only limited really effective results. Interventions in appropriate infrastructure in core areas are of course very important, but, in the opinion of the authors, they should be financed mainly through existing and expanding private resources (project finance) and local public resources, not through national/European resources.

The results for the period 2012–2030—obtained through the estimation of a third version of the MASST macroeconometric regional growth model and the consequent simulations run in order to obtain "quantitative foresights" for the four scenarios—are rather impressive. In aggregate terms, the 'Cities scenario' is, at the same time:

– the most expansionary among the three, both in Western and Eastern EU countries (Table 17.1); and
– also the most cohesive one, showing the least increase in overall regional disparities (Theil index: Fig. 17.3a), thanks to the best outcome in terms of reduction in between-countries disparities (catching up by lagging countries: Fig. 17.3b) and a limited relative increase in the within-country disparities (Fig. 17.3c).

As expected, the 'Megas' scenario is the least cohesive, but more expansionary with respect to the 'Regions' scenario—the extreme version of a traditional cohesion policy—while this latter is—almost by definition—the most cohesive in terms of within-countries disparities.

Evidently, an endeavour to extend development outside the traditional core areas in the direction of second and third-rank European cities is likely to bring multiple advantages: exploiting a wider mass of potential territorial capital assets, avoiding the drawbacks of agglomeration diseconomies and the inflationary costs of excessive spatial concentration and supporting spill-over effects and potentials for endogenous development in the urban poles of lagging and peripheral regions.

17.5 Regional Development Policies: Acting on Territorial Capital Through 'Territorial Platforms'

Territories may be conceived as multi-dimensional spaces: each dimension represents the presence of stocks of single types of territorial capital: location, size, quality, internal and external interactions. Relationships of a functional, hierarchical or co-operative nature may take place within the single dimension (economic, social, environmental, cognitive, identitarian, . . .) or, more interestingly,

Table 17.1 Aggregate annual regional GDP growth rate 2012–2030 forecasted by scenarios

Macro-regions	Scenarios						
	Baseline				Megas	Cities	Regions
EU27	1.89	2.22	2.31	1.82	0.33	0.42	−0.06
Old15	1.88	2.22	2.32	1.81	0.34	0.44	−0.07
New12	1.93	2.22	2.23	1.98	0.29	0.30	0.05

Source: MASST3 results (ESPON ET2050 Project)
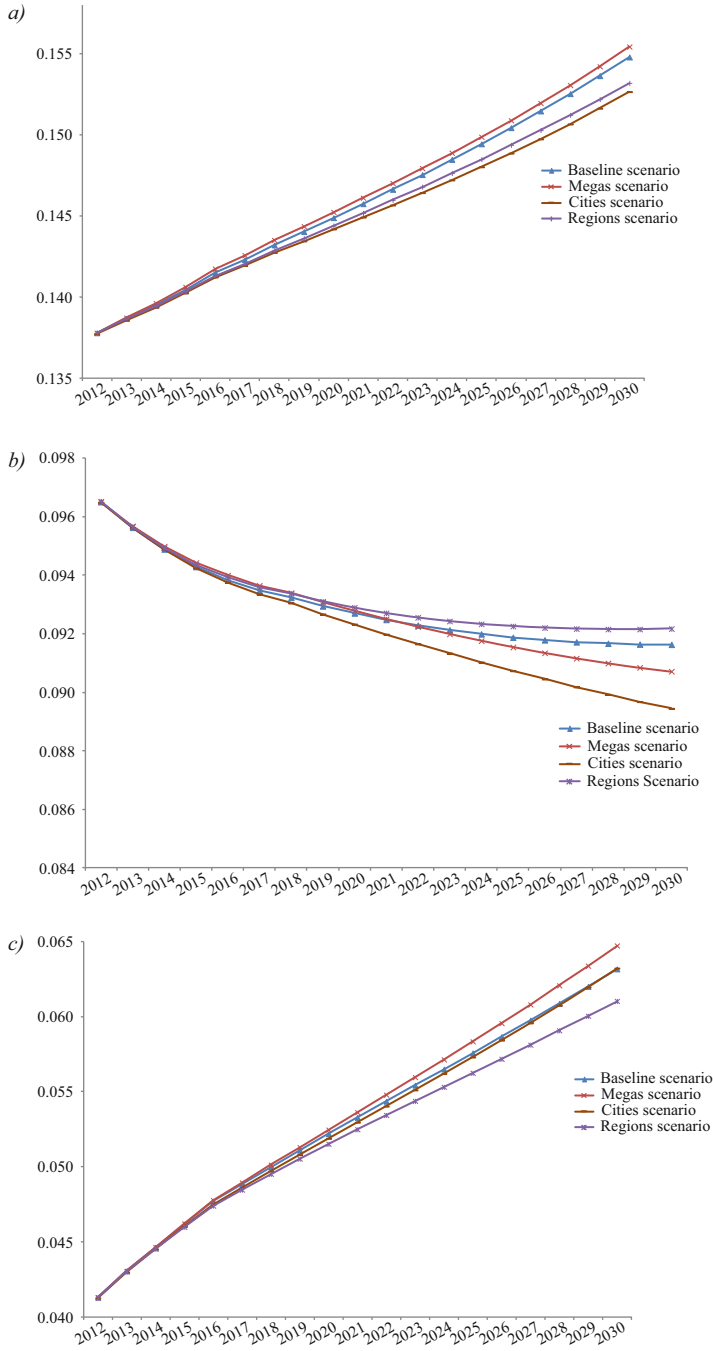
Fig. 17.3 Expected regional disparities in the EU: Theil index on overall, between-countries and within-countries disparities, 2012–2030. Source: MASST3 results (ESPON ET2050 Project)

among the different dimensions, generating huge and diversified cross-externalities and synergy effects.

The conceptual breakthrough allowed by the relatively new concept of territorial capital (OECD 2001; EC 2005; Camagni 2009) consists in the almost infinite widening of the structural and functional relationships that are assumed to determine the growth potential of single places/regions, along the scientific trajectory of the last 70 years in the direction of an ideal place-based production function with heterogeneous capital assets. At the beginning, this trajectory was epitomized by Solow's simplified and stylized model with only two explicit arguments, namely capital and labour, and a third black box encompassing a large residual called 'technical progress' (Solow 1957). Since the 1980s, Solow's production function has been enriched by the consideration of infrastructure and energy inputs (Biehl 1986) and later of different labour typologies (Romer 1986), elements of social capital (Putnam 1993), information (Capello 1994) and knowledge (Paci and Marrocu 2013). In this pathway, the 'quasi-production function' loses its capacity to interpret distributive shares, but maintains the logical link with single, total and cross-factor productivity, ideally reducing the width of the residual unexplained element in regional development.

The full spectrum of territorial capital types may be considered and included, provided that good measures or proxies are available, ranging from material natural and cultural heritage to non-material human and cognitive capital, from artificial public goods to private capital goods, from the structure of the urban system to identitarian capital, from club goods—like private networks—or impure public goods—subject to congestion effects and opportunistic behaviour—to social or relational capital.[9]

Regional policy interventions following a place-based philosophy should first of all recognize the multi-dimensional nature of development processes and the multi-layered nature of the territorial realm. This means:

– re-visiting the early literature on the 'balanced' nature of economic development (Young 1928; Rosenstein-Rodan 1943) and the structural characteristics of the historical 'stages of development' (Rostow 1960), as well as the literature on the 'localised' and path-dependent trajectory of innovation (and consequently of innovating territories) (Nelson and Winter 1982; Malerba and Orsenigo 1997; Dosi 1982);

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[9]Justifying the importance of these assets, measuring them and including them in a regional development econometric model is the challenge and the scientific programme undertaken by the Milan team of regional and urban economists (Roberto Camagni, Roberta Capello, Ugo Fratesi, Camilla Lenzi, Andrea Caragliu, Giovanni Perrucca, in decreasing age order), with the construction of the MASST model and the related analyses on synergetic vs. idiosyncratic relations among different types of territorial capital. See: Camagni (2009), Capello et al. (2011a), Perucca (2014).

– recognizing the necessity of an integrated and intersectoral approach to policy delivery, as perfectly demonstrated by the huge, pervasive and unexpected success of the well-designed Urban Initiative;
– tailoring each policy tool to the structural, institutional and territorial specificities of each place, interpreting its 'stage of development', its socio-economic structure, its knowledge endowment and learning capability, its typical 'innovation pattern' (as seen above);
– forcing actions addressed to achieving specific goals to interact synergetically with other policy goals: accessibility with environmental equilibrium; exploitation of natural and cultural heritage with the requirements of the identitarian evolution of places; knowledge creation with local production 'vocations' and entrepreneurial enhancement;
– addressing the conservation, completion, improvement and best use of the various types of territorial capital, selecting the excellent and most promising ones and combining those which seem crucial for pursuing the most appropriate development strategy devised from-below. This means the harmonious merging of material and non-material elements, functional and relational assets, economic, social and environmental aspects; the creation of new cooperation networks among local actors, and between them, policy-makers and external bodies, through renovated, willing and cohesive local communities; and support for innovation through synergetic behaviour, internally but also in cooperation with external actors (Camagni and Maillat 2006; Camagni et al. 2014a).

This integrated strategy can be synthesised in the concept of 'territorial platforms', a concept depicting a 'territorialisation' philosophy and close matching and full integration—in functional, physical, economic, social and aesthetic terms—between new development projects and the local realm, at the same time mobilizing multiple local resources over a wide area in synergy with public action (Camagni 2011).[10]

Four kinds of territorial platforms may be conceived:

– 'knowledge platforms', enlarging the scope of R&D and innovation policies beyond the geographical limits of development poles, involving competences, human capital and mobility/education services on a wider geographical space (corridors, valleys, metropolitan areas, networks of cooperating cities);
– 'identity platforms', integrating the conservation and wise exploitation of natural, cultural and landscape resources with complementary activities not only of tourism receptivity but also of research (environment and culture), education and training, advanced services provision (wellness and health services for new retired residents);

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[10]The term 'platform' has also been recently utilized with a slightly different meaning by the Italian government in its infrastructure plan and by Phil Cooke with regard to innovation policies (Cooke et al. 2010).

– 'infrastructure platforms', allowing the best integration of new infrastructure into the local environment, landscape and physical networks, considering feedback effects from the new accessibilities provided on the locational decisions of companies and real estate developments;
– 'urban platforms', enlarging development potential from single cities to city networks—metropolitan urban systems, second-rank cities interlinked and co-operating on 'synergy' or 'complementarity networks' (Camagni 1994), city-regions organised on nodes, corridors and green networks—mainly operating on transport, communication and information infrastructure.

17.6   New Challenges for Central and Eastern European Countries[11]

In Western European countries, regional development strategies and policies must necessarily be different from those addressed to, and developed by, Central and Eastern countries (CEECs), which are now facing different challenges and difficulties in carrying out their transition phase (European Bank for Reconstruction and Development 2013). Moreover, CEECs are no longer a single and homogenous area: they are nowadays characterized by a clear eastern periphery and are showing differentiated patterns of growth, based on different assets and territorial structures.

The main economic and spatial challenges, requiring appropriate policy answers, may be indicated as follows.

The first challenge refers to the macro-economic sphere: the necessity—shared with those European countries, mainly Southern ones, exhibiting difficulties in this same field—of carefully monitoring the trend of external competitiveness synthesized by the trend of unit labour costs, or better, of the real effective exchange rates, keeping wage increases in line with productivity increases.[12] Empirical evidence shown in Fig. 17.4 suggests that the initial cost competitiveness of all CEECs was rapidly reduced from 1994 to 2009, and that only a few countries, such as Poland, Slovakia (Fig. 17.4a) and Slovenia (Fig. 17.4b), and, to a lesser extent, Hungary (Fig. 17.4a) succeeded in maintaining their 2004 level of competitiveness afterwards.

This challenge should not be met by relying on currency devaluations, a tool that may be useful in very critical circumstances but provides only short term advantages. Elements that should be strictly monitored are the transfer of high monetary wages from the modern sectors (and regions) to traditional sectors (and regions);

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[11]This section builds upon the highly fruitfull scientific interactions engaged inside the Grincoh Project (see footnote 2).

[12]This was the essence of the Irish miracle, from accession to the early 2000 years, subsequently jeopardized by the real estate bubble, in its turn fuelled by an excessive concentration of development on the capital city area. At the end of the last decade Dublin had become (one of) the most expensive city(es) in Europe!
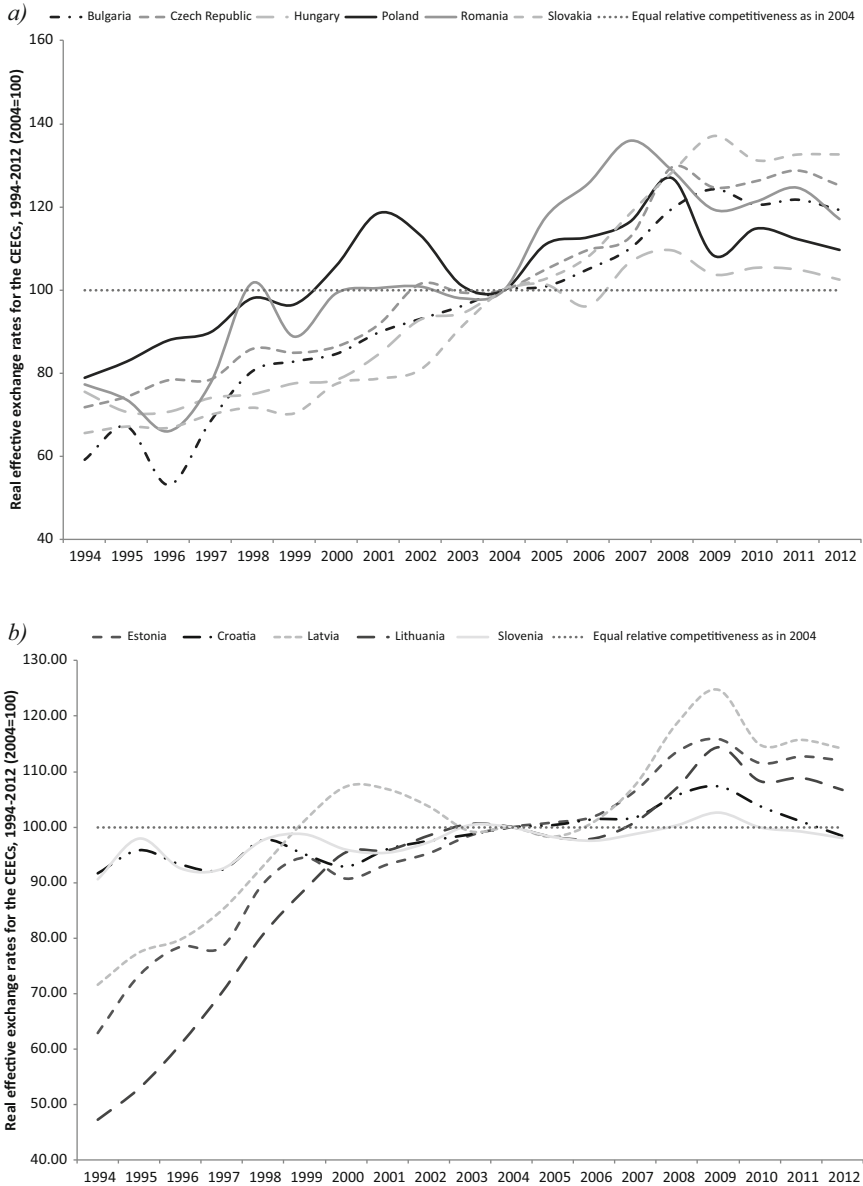
Fig. 17.4 Theil Index by Scenario: Regional Disparities. (**a**) Total disparities, (**b**) between countries disparities, (**c**) within countries disparities. Source: MASST3 results (ESPON ET2050 Project)

real estate bubbles due to excessive concentration of growth in a few urban areas; process and product innovation; productivity/wages equilibrium.

The second challenge, of an industrial nature, refers to the need to move towards a new and different stage of development, relying less on FDI and more on

endogenous investments, taking advantage of technological multipliers and technological spillovers from MNCs into the local fabric. Also crucial is enhancing local entrepreneurship by relying on existing industrial relations and existing skills, competencies and specializations.

The third challenge refers to controlling rent increases and monopoly powers, in real estate and in commercial activities but also in industrial and financial ones. Rents erode personal disposable incomes and industrial profits, lowering the endogenous growth potential of countries. The counter-measures required to restore an acceptable equilibrium concern the fight against monopoly practices and corporatist limits on supply, anti-trust policies, discouragement of real estate speculation and strengthening of its taxation.

The fourth challenge, of a territorial nature, refers to the need to enlarge development areas beyond the small set of core areas (metropolises, capital regions) towards second (and third)-rank cities. This strategy reduces inflationary pressures, enlarges the economic base of countries, and allows better exploitation of existing, diffused territorial capital. This may be possible and highly desirable in larger countries, like Poland, or in a countries like the Czech Republic or Hungary; in others, it may be somehow more difficult, but worth to try.

The fifth challenge refers to governance. The imperative consists in improving national and local government activity in the promotion, financing and management of regional development projects: exploiting untapped local resources through local strategic and industrial plans, avoiding lock-in strategies reinforcing existing local monopolies, limiting rent-seeking behaviour by local stakeholders, fighting corruption. Priorities in this list of needed actions are country-specific and should be defined by the single countries.

The sixth challenge is a cognitive one, namely avoiding the risk of losing the strong potential advantage residing in the present scientific excellence of CEECs in many pure and applied science fields. In the absence of a tradition of cooperation with the local production fabric and of a market-oriented organizational capability, the scientific milieu of these countries may easily out-migrate to western countries.

The seventh challenge is methodological: regional development policies should act through integrated territorial projects and 'territorial platforms', bearing in mind the multi-dimensional nature of development and the necessity to leverage the specificities and potentials of territories.

17.7 Conclusions

The present long period of crisis and the related imperatives of tight fiscal policies in highly indebted countries has generated an impressive outcome in the EU space: an interruption of the long term, historical trend towards decreasing inter-regional disparities. The preceding trend was mainly fuelled by the vigorous catching-up process of many relatively weak countries that joined the Union at different times—Italy in the early founding years, and subsequently Spain, Ireland, to a lesser extent Portugal and Greece, and finally the new Eastern Member countries—while intra-

national disparities, especially in the early phases of integration, were constantly exhibited a rising, but less vigorous, trend. The crisis added a new challenge to policy makers: the evidence of large negative country effects in southern European countries and a lower catching-up pace in Eastern countries, all trends that our econometric forecasts indicate will not be easily overcome in the near future.

In these conditions, cohesion policies are now facing new, partly unexpected challenges, in that they must operate amid tight macroeconomic constraints, reduced public resources and increasingly pessimistic political attitudes. Furthermore, the need to be more selective in targeting public development resources generates the risk of a shift in policy priorities away from cohesion goals and towards short-term competitiveness goals that inevitably redirects attention—and resources—towards core areas, where returns on public and private investments seem faster and higher.

The paper has advocated a strengthening of cohesion policies by recalling their multiple economic justifications especially in difficult periods of crisis and denying the existence of the assumed, traditional trade-off between cohesion and development goals if a new concept and style in regional policies is followed. The new target should be the largest mobilization of existing territorial capital assets, and in particular of local excellences and competences, present and dispersed in almost all regions, though a bottom-up 'discovery' process led by local élites and intermediate bodies in cooperation with external actors involved in industrial and knowledge production, tailored to the potentials and specificities of individual places.

Innovation policies, too, should renovate their intervention philosophy by pursuing a wise concentration of R&D investments—very different from the past—but also devising new intervention strategies in non-core regions. These strategies should fit with the actual 'innovation pattern' followed by each region, supporting the blending of external knowledge (in different forms: patents, researchers, scientific consultancy, direct investments) with local productive 'vocations', competences and productive traditions, deepening and widening the present specialization through 'smart' incremental innovation. Operating inside the actual 'pattern' with renewed strategies may provide relevant development opportunities for regions of all kinds, with no necessary hierarchical ranking—as shown by the average recent economic performances of each innovation pattern in Europe, which are not at all correlated with the local knowledge content and R&D investment (Capello and Lenzi 2013; Camagni et al. 2014b). Trying to jump into new, more local knowledge-intensive patterns, 'jumping the technological queue' might be possible in some, not easily foreseeable, cases, but it would be too risky to commit public money to that specific goal in the absence of convincing projects and partnerships.

Recalling the 'balanced' nature of any long-term development process, policy interventions should pursue an integrated nature—acting on multiple dimensions—and match the specificities of places. The concept of 'territorial platforms' could help in this case, suggesting and supporting the potential complementarities among material and non-material, economic and cognitive, social and environmental actions and goals.

The paper has finally considered the case of Central and Eastern European Countries, focusing policy suggestions on the specific challenges that these countries are now facing in their structural and institutional transition. Macroeconomic issues—e.g. controlling the trend of unit labour costs and real effective exchange rates—have been coupled with spatial ones—e.g. the necessity to enlarge development areas towards second-rank cities and to control real estate bubbles and land rents. Industrial and social issues converge in the need to enhance local entrepreneurship and to better mobilize the present excellences in many scientific fields in order to enter a new development stage, relying less on foreign investments alone but exploiting all the potential synergies, economic and cognitive, between foreign investments and local culture.

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Towards Creativity-Oriented Innovation Policies Based on a Hermeneutic Approach to the Knowledge-Space Nexus

18

Roberto Camagni

18.1 Introduction

The hermeneutic approach to a proper understanding of the processes of knowledge creation that is proposed by Cusinato and Philippopoulos-Mihalopoulos (2016) is indubitably a cognitive turn in the economic literature on innovation, and it may be a first step in the construction of a new scientific paradigm. In fact, it explores the deep-lying roots of creativity and innovation as cognitive processes and links them with such relational spaces as the abstract 'milieu' and the—real city. Accordingly, the hermeneutic approach positions itself on a long-standing scientific trajectory which originated with the work of Joseph Schumpeter (1934, 1964) and was relaunched by the evolutionary paradigm in the 1980s (Nelson and Winter 1982; Dosi 1982; Dosi et al. 1988; Lundval 1988) and the more recent studies on the role of knowledge and knowledge creation in economic development (Cappellin 2007; Cappellin and Wink 2009). It thus characterizes itself as a critique of the limits of the logical-positivist and cognitivist approach.

What is more interesting for a regional scientist is the new interpretation of the generative role of space that the hermeneutic approach proposes. This interpretation, which is mainly presented in the general introduction and in the contributions of the two editors, builds and accumulates new fruitful perspectives on the achievements of the neo-Marshallian school (Becattini 1979, 1990; Brusco 1982; Garofoli

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1989; Vazquez-Barquero 2002; Boix and Trullen 2007) and of the 'evolutionary' regional economics research programme carried forward by the GREMI network with the concept of the *innovative milieu* as a relational space and an operator for the reduction of dynamic uncertainty in innovation processes (Aydalot 1986; Camagni 1991; Camagni and Maillat 2006).

This paper thoroughly inspects this second scientific trajectory and underscores the novelties brought by the new paradigm (Sect. 18.2). It then elaborates a logical framework on which new place-based innovation policies and new policy styles could be devised (Sect. 18.3). Some tentative conclusions will follow (Sect. 18.4).

18.2 The Knowledge-Space Nexus: From the Neo-Marshallian to the Evolutionary to the Hermeneutic Approach

In regional science the scientific trajectory from a neo-Marshallian to a hermeneutic approach to the knowledge-space nexus was, and is, characterized by a significant presence of Italian scholars (Capello 2009; Garofoli 2009; Ciciotti 2009; Calafati 2009). For many decades, in fact, economic space was interpreted outside the usual geographical-geometrical dimension in 'relational' terms as 'territory'—a "set of functional and hierarchical relationships embedded in geographical space" (Camagni 1980)—and as a socio-cultural system (Becattini 1979).

In particular, the Marshallian industrial district, often simplified and misinterpreted as a mere specialized and flexible clustering of firms, was defined as "a socio-territorial entity which is characterized by the active presence of both a community of people and a population of firms in one naturally and historically bounded area", sharing a "system of values (which) constitutes one of the preliminary requirements for its development and one of the essential conditions of its reproduction" (Becattini 2004, pp. 19–20)[1]. It generates a "localised thickening of inter-industrial relationships" and institutions, providing strong local externalities (Becattini 2004, p. 16).

The role of socio-economic proximity was interpreted as making the market work more efficiently (Becattini 1990). In fact, the economic behavior of local agents in "a community market" is regulated by social norms and sanctions which punish opportunistic behavior (Dei Ottati 1995). Reputation represents, as in 'repeated games', an intangible asset that ensures reduction of transaction costs and a firm's survival. A sense of belonging to a specific community and social identity underpin trust relations which foster collective action and inter-firm cooperation in the form of incomplete, informal and flexible contracts. These local synergies give rise to increasing returns and locational advantages for district firms: interestingly, the agglomeration economies emphasized by the New Economic Geography (NEG) school in the same years (Krugman 1991; Fujita et al. 1999) stem in this case from local synergies rather than from the pure indivisibilities and pure pecuniary externalities considered by that school.

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[1]English translation of a seminal paper published in Italian. See Becattini (1979).

Of course, the Marshallian message concerning the 'mysteries of industry' circulating 'in the air' was well understood by the industrial district school. Nevertheless, the presence of social and relational capital and the sharing of competences and know-how was not conceptually utilized in a cognitive direction, but mainly in regard to the reduction of production and transaction costs, risk-sharing among firms and collective action; and for interpreting the competitiveness of small firms systems rather than for interpreting innovation processes as static externalities rather than dynamic ones.

On the other hand, a different research programme starting from similar conceptual premises concerning the role of institutional features generating trust, sense of belonging and local identity, directly addressed innovation processes by proposing a novel theoretical interpretation of the local space: a programme that was called "evolutionary regional economics" (Calafati 2009). Conceptual pillars were found, first of all, in the Schumpeterian (Mark 1) concept of a 'creative destruction' process subverting any static equilibrium condition leading to a zero-profit state through waves of endogenous energy: innovation processes led by entrepreneurial spirits (Schumpeter 1934, 1939). The second pillar was the full inclusion in the theoretical scheme of the presence of uncertainty, static and dynamic, and of the impossibility of a substantive rationality to cope with it (Arrow 1969; Simon 1972)[2]. Imperfect markets; risks of opportunistic behavior; limited capacity to collect, select and transcode information; and in a dynamic context, typical of innovation processes, an imperfect capacity to assess decision outcomes and imperfect control of other actors' moves: all these call for devices and operators able to reduce uncertainly. Large firms respond through size and acquisitions ('hierarchy')[3] or with cooperative agreements (Williamson 1985); small firms find support and conditions to prosper in the local 'milieu'.

Thus, the third pillar, which introduced a theoretical conceptualization of the role of space in evolutionary processes, specifically regards the local 'milieu', defined as a set of territorial relationships coherently encompassing a production system, different economic and social actors, a specific culture and a representation system, and generating a dynamic collective learning process (Maillat and Crevoisier 1991; Perrin 1995). Its crucial role is that of a "collective operator reducing the degree of static and dynamic uncertainty of firms by tacitly or explicitly organizing the functional and informational interdependence of local actors and informally performing the SSSTTC functions" of information search, selection and transcoding; market signalling; ex-ante coordination of economic

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[2]Cusinato (2014) interestingly underlines the "amazing" fact that creativity is indirectly implied by—as a by-product of—bounded rationality.

[3]The large company is able to control complexity and uncertainty by managing bounded rationality: R&D divisions mainly perform the selection and 'transcoding' functions of information; the necessary internal integration of departments is guaranteed through informal meetings or formal coordination; market demand and needs may be artificially driven; competitors may be controlled through agreements, financial power, other forms of 'suasion' Camagni (1991). This represents one of the possible organisational forms of a milieu.

actors enhancing collective action; transformer of external energies to the needs and uses of local firms; tentative and partial control on competitors, other actors and the direction of technological progress (Camagni 1991, p. 132). It is important, in the context of this book, to underline the relational, interactive and collective nature of this cognitive process and the role of the milieu in "allowing [transaction] costs reductions and enhancing the effectiveness of dynamic decision-making process of local firms" (ibid., p. 130): the sharing of linguistic and cultural codes, trust, local identity and sense of belonging, easy cooperation capability and wide internal mobility of specialized labor within the local space represent the fuel of these cognitive processes.

Further interpretative developments were achieved when the milieu concept was used to understand the cognitive nature of the city: a social construction oriented to interaction, exchange and economic efficiency, historically known as the birthplace of creativity and socio-cultural innovation; a special form of milieu, despecialised and diversified, hosting possibly multiple milieus (Camagni 1999; Crevoisier and Camagni 2000; Cusinato 2007). The proximity of differentiated elements, the presence of a relational thickness (or a 'dynamic density' *à la* Durkheim) and the coexistence of both interconnections and anonymity generate casual contacts, a multiplicity of opportunities, redundancies and access to "a pool of indeterminate information" conducive to new knowledge creation: "the milieu effect in the city does not mostly follow from programmed encounters for the resolution of limited technical problems" but from unintentional and random links (Rémy 2000, pp. 36–37; my translation).

Especially when speaking about the city, but also in the case of specialized industrial districts and milieus, the dimension of external accessibility and interaction is crucial. In fact, there is a high risk of being locked-in a self-referential set of codes, symbols, behavioral habits and competencies, with potentially disruptive effects in terms of evolutionary and creativity perspectives. This risk is overcome through the establishment of multiple interconnections with the external world, in terms of physical infrastructure, transport and communication services, trade and cooperation agreements, immaterial networks in the fields of finance, diplomacy, economic decision-making and culture.

External networks were pointed to as a second 'operator' allowing uncertainty reduction for both the firm and the specialized milieu and the enhancement of their creative capability (Camagni 1991). In the case of the city, they are the drivers of its intrinsic centrality and the means through which the urban milieu opens up to the external world (Rémy 2000).

The concept of localized collective learning processes, in the economic and institutional fields, was subsequently developed and utilized to interpret knowledge creation in high-tech urban districts, valleys, routes, glens, through both theoretical and econometric analyses (Capello 1999; Keeble and Wilkinson 2000).

In the evolutionary perspective, abstract space becomes a 'place' and a 'territory' encompassing at the same time a system of localized competences, skills and pecuniary externalities (agglomeration economies), a system of socio-cultural relationships, values and representations (identitarian capital), a set of shared

beliefs, linguistic and interpretative codes (cognitive capital), a set of accepted rules and economic practices (institutional capital). These are different forms of territorial capital (Camagni 2009) which do not derive from geographical proximity alone but also from organisational and cognitive proximity (Rallet and Torre 1995; Boschma 2005; Asheim et al. 2011; Torre and Wallet 2014).

In the case of cities, also the urban form and the spatial arrangement of physical space appear to matter in the generation of urban development. Compactness, conducive to contacts and easier face-to-face interaction; long-distance cooperation networks in the scientific and research fields; a polycentric structure of the metropolitan and regional urban system: these proved to be at the basis of both levels and increases in productivity/attractiveness of EU cities in the first decade of the present century (Camagni et al. 2013, 2014). Interestingly, urban size alone, though linked to the productivity levels of cities as a consequence of static agglomeration economies, does not seem to be statistically significant in the explanation of dynamic agglomeration economies, i.e. it is not the best indicator of ongoing innovation processes (Camagni et al. 2014).

Innovation may also come about following differentiated spatial 'patterns' linked to the differentiated availability of territorial capital (particularly urban structure, accessibility, general development level, specialisation) and cognitive inputs (education, skills, R&D, entrepreneurship). A recent inquiry on the regional dimension of the knowledge economy in the European spatial realm (Capello and Lenzi 2013) shows the existence of three main patterns (and their variants), understood as "different modes of performing and linking the different phases of the innovation process" (p. 9), that is: a science-based endogenous pattern, a creative application pattern and an imitative pattern. The various components of the cognitivist, linear model of innovation—knowledge → invention → ideation → innovation → development—are broken down, separated, differently allocated in time and space, and finally recomposed following a relational logic of inter-regional cooperation and exchange. Innovation assumes a *relative* connotation—as a localised novelty in products, in technological or commercial processes, in organisation *with respect to the past*, not with respect to some best practice realised elsewhere—and, interestingly, it does not empirically exhibit a hierarchical sequence among the different patterns in terms of economic outcomes (productivity or GDP increases, innovation density). These results open new ways to devise renewed normative guidelines for "smart innovation policies" (Camagni and Capello 2013).

Therefore, in the evolutionary theorization, space matters when is understood as milieu: a relational, identitarian and cognitive space. It shapes propensities to cooperate and innovate; it furnishes the cognitive preconditions for innovation through the presence of context-specific know-how, density of information spillovers, trust in interpersonal relationships; and it reduces the strategic uncertainty intrinsic in any innovation process. Urban milieus add to the conceptual picture an original and potentially creative coexistence between homogeneity and

heterogeneity/diversity[4]; their stronger image in internal and external social representations; their nature as interconnection nodes among different long-distance transportation, communication and economic/political networks.

All these conceptual elements are largely similar to and compatible with the characterization of the 'generative milieu' hypothesized by the hermeneutic approach: social volume, diversity; relational density; image space and material substratum. The conceptual definition of the role of space in innovative and evolutionary processes is clear; but it is also true that a last step is lacking. This concerns the way in which new knowledge is generated (the "how") (Cusinato 2014) at both the micro and meso level of analysis. In the evolutionary paradigm, the entrepreneur somehow remains separated from his/her context or milieu: this latter supports him/her in the innovation process and cognitively interacts with him/her, but the two remain distinct, and they are distinctly defined from the outset—an effect of the original methodological individualism permeating economic thought.[5] The missing link consists in the fact that the context and the entrepreneur evolve together, closely bound up with each other in a process of knowledge creation and accumulation permeated by an interactive learning logic and a procedural rationality *à la* Simon (1972). "Knowledge . . ..emerges together with the social space where it is situated and, on the other hand, . . ., knowledge reflects, in its irreducible multiplicity, the diverse social spaces and aggregates where human beings live their social experiences" (De Michelis 2014). And knowledge does not pre-exist innovation and creativity: "knowledge is co-essential to creativity" (Cusinato and Philippopoulos-Mihalopoulos 2014).

The emotional and symbolic dimension plays a constituent role in this process of knowledge creation and creativity. Social and reciprocal 'recognition' is the expected reward and "gives sense to the entire process" (ibid.). Relational emotions (i.e. affects) like those felt in, and thanks to, the milieu atmosphere induce people to explore new re-combinations of existing knowledge and beyond. The place becomes a 'field of emotions', a 'landscape' recognized, interpreted and appropriated by a collectivity of people in an identitarian sense. Physical elements and the spatial arrangement of public and private spaces matter in this context because of their symbolic meanings.

Creativity emerges not just at the basic level of processing information (L1 in Cusinato's work, according to Bateson) but also at the higher levels of processing

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[4]The city "produces intelligence: it chokes internal uniformity and develops with the shock of diversity" (our translation) (Ansay and Schoonbrodt 1989, p. 18).

[5]In an only partially different context, when discussing territorial competitiveness, the present author emphasised the need to overcome methodological individualism by giving full recognition to the role of territory: "if individual firms and individual people undertake collective activities, facilitated by (and creators of) trust and local social capital; and if significant cognitive synergies, readily apparent in the local *milieu,* result from their various interactions; and finally if these actions and these processes draw additional vitality from cooperation with local public administrations; then it appears justifiable to go beyond methodological individualism - which regards only single firms as operating and competing - arguing the logical validity of a 'collective' concept such as that of *territory*, and to affirm that territories compete among themselves, using the creation of collective strategies as their instrument." (Camagni 2002, p. 2406).

interpretative codes as the reflexive assessment of mental processes through dialogue, relationality and the recognition of others' mindsets (L2), and as the capacity to change cognitive codes and beliefs (L3).

Years ago, the present author proposed a theoretical taxonomy of the roles of the (large) city based on a double entry matrix crossing the spatial logic (territorial and network approach) and the cognitive logic (functional and symbolic approach). The city was supposed to perform four interconnected roles: as a pure cluster/agglomeration supplying density and diversity, proximity, reduced transaction costs; as a node interconnecting multiple transportation, communication and economic networks; as a milieu reducing dynamic uncertainty and a substrate for collective learning processes; and as a symbol of territorial control and mastery producing symbols, codes and languages (Camagni 2001). The cumulative interaction among these roles was presumed to be at the basis of the historical success of the city as a particular socio-spatial form of organization, but also to be conducive to possible contradictions concerning the limited ability of planning to master a rapidly increasing physical size, in the presence of enhanced potential effects of new communication technologies and the crucial role played nowadays by cognitive processes.

The same scheme can now be revised and enlarged to encompass other constituents underlined by the hermeneutic paradigm and thus complete the conceptual picture (Table 18.1). The two spatial logics are maintained—territorial and network—and an extra dimension is added besides the functional and the cognitive ones, namely the symbolic dimension. This last dimension encompasses processes by which urban spaces are recognized, appropriated and attributed sense by a local community. The city itself becomes an image-space, a 'landscape'; the emotional dimension becomes bound up with the spatial dimension within the milieu. As a synthesis of the different dimensions encompassed, the city is interpreted as a 'knowledge-creating milieu': a generator of symbols, codes, and languages capable of blending different forms of knowledge—analytic, synthetic, artistic (Asheim et al. 2011)—all simultaneously present in it, even if they are differently located in specific but interlinked urban places.

Paraphrasing Cusinato (2014), we can assume that the knowledge-creating milieu is a socio-spatial device that, thanks to the five structural conditions—volume of contacts and heterogeneity of mental habits, interconnection of multiple networks, relational density and socialisation, global openness and interaction, shared symbolic representations and meanings attributed to physical spaces—drive and accompany reflexive forms of learning conducive to creativity.

The separation between the subject and the spatial context, which is still present in the cognitive, evolutionary approach to creativity and innovation, is overcome as the creative subject becomes him/herself part of the creative milieu, and as the act of innovation becomes part of a hermeneutic, socialized, reflexive and contextualized process of knowledge creation.

Table 18.1 The roles of the (large) city: a theoretical taxonomy

SPATIAL LOGIC / HERMENEUTIC LOGIC	TERRITORIAL DIMENSION	NETWORK DIMENSION
FUNCTIONAL DIMENSION	**CITY AS AGGLOMERATION** • volume and density of contacts • internal heterogeneity • specialization • concentration of externalities • reduction of transaction costs • spaces for selective or casual meetings • coexistence of interaction and anonymity	**CITY AS INTERCONNECTION** • city as a node in multiple and interacting transport, economic and communication networks • city as interconnection between place and node

COGNITIVE DIMENSION	**CITY AS MILIEU**
	• relational density
	• sharing of languages, codes, values
	• sense of belonging, identity
	• substratum for collective learning
	• uncertainty-reducing operator through:
	  ◊ socialized transcoding of information
	  ◊ ex-ante co-ordination of private decisions (collective action)
		CITY AS GLOBAL INTERACTION
		• link among global milieus
		• global exchange of codes and languages
		• interaction in 'augmented' spaces
		• gateway for global reach
		• city as control over space and time
		• city as symbol of territorial mastery
		• city as powerhouse / transformer of internal and external energy

SYMBOLIC DIMENSION	**CITY AS LANDSCAPE** • image – space • affect – atmosphere – emotion • shared symbolic representations • public spaces symbolically recognized and appropriated by a local community in an identitarian way	**CITY AS KNOWLEDGE-CREATING MILIEU** • creation of symbols, codes, and languages • fostering reflexive forms of learning • blending of different forms of knowledge: analytic, synthetic, artistic

Source: Adapted and enlarged from Camagni (2001)

18.3 Towards Creativity-Oriented Development and Innovation Policies

Any normative and policy reflection almost necessarily implies—and in fact has implied in the recent experience of regional policies in the EU countries—some degree of positivism and functionalism, and the use of some simplified cause-effect approach in the identification of policy levers. The effectiveness of policy suggestions is expected to be liable to some more-or-less precise ex-ante assessment, which appears legitimate to require as far as public resources are concerned.

This condition has evident shortcomings. Firstly, simplification of the logic pushes towards the identification of single development drivers valid in any spatial context. This attitude may be acceptable in the case of some relevant and *necessary* preconditions for growth, such as the availability of basic infrastructure and accessibility devices, which nevertheless have almost always proved not to provide *sufficient* conditions for the generation of a durable development. In the case of more selective and sophisticated policies, like knowledge and innovation ones, this same attitude—evident in traditional sector-based approaches to the knowledge economy (targeting high-tech sectors) or function-based approaches (targeting R&D functions)—have proved to be not just ineffective but even plainly wrong,

with the consequent waste of public money (OECD 2011; Barca et al. 2012; Camagni and Capello 2014).

Furthermore, a strategy supporting single actors—like firms, research units, high-education institutions—often turns out to represent a prize to potential opportunistic attitudes hiding goals that are very far from the ones expected by policy-makers (Camagni and Capello 2009).

The cognitive and evolutionary approach to innovation policies introduced a first novelty in policy frameworks and practices by stressing the importance of the relational, cultural and psychological elements that define the preconditions for knowledge creation, development, transmission and diffusion. Especially in contexts characterised by a plurality of agents—like cities or industrial districts—knowledge evolution "is not the result of individual efforts in R&D within individual firms, but rather the combination of complementary capacities and of widespread interactive learning processes, which involve many 'customers' and 'suppliers' along a well-defined filière or supply chain" (Cappellin 2003, p. 307). Interactive learning processes are indicated as the core processes on which policy attention should be focused; and given the localised nature of these processes, places and territories should be targeted and their specificity taken into consideration by so-called 'place-based' policies (Barca 2009; OECD 2009).

Operationally, some of the suggested strategies referred to a policy intervention addressed to the interaction areas between the three main sub-systems participating in the process of knowledge creation and innovation: society (and general education systems), science/technology, and economy/entrepreneurship. The interaction areas were indicated in the integration between R&D institutions and the general and higher education system; in the presence of efficient transcoding and transfer systems to translate research outputs into a language that firms can understand and use; and in the presence of knowledge-oriented entrepreneurship and in learning-oriented labour markets (Fig. 18.1) (Camagni and Capello 2009). Public resources should be allocated, not to the individual actors (universities, research centres, companies), but to joint projects developed in cooperation among them on a local/regional dimension and facilitated by local public administrations.[6] A conjoint econometric analysis based on direct investigation of 160 firms confirmed the important role of three elements—transcoding and transfer agents (in this case, efficient science parks), the absorptive capacity of firms (accumulation of firm-specific knowledge through R&D), and territorial relational capital in the form of local but external sources of knowledge (interaction with competitors, providers, customers, universities and knowledge facilitators such as advanced tertiary activities)—in the innovation performance of individual firms (ibid.). Most of these relational activities and functions are directly or indirectly performed by the KIBS—knowledge-intensive business services—or the KCS—knowledge-creating

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[6]The recent French strategy of building regional 'pôles de compétitivité', to date quite successful (Musso 2014), is based on similar conceptual premises.
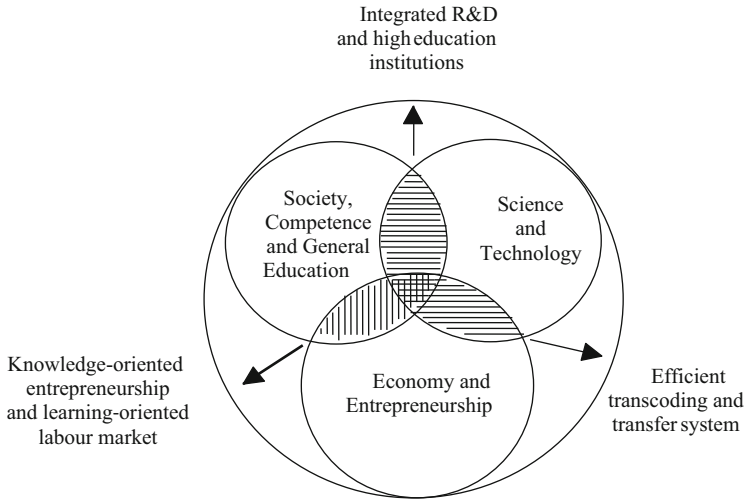
Fig. 18.1 An integrated approach to the knowledge society: the three relational pre-conditions. Source: Camagni and Capello 2009

services—mentioned by the recent literature (Cappellin and Wink 2009; Cusinato 2014) which act as knowledge catalysts through their bridging role.

In more general terms, the paradigm shift brought about by the new cognitive approach entailed the consideration of new elements and processes, sometimes enlarging, but mostly superseding, the previous strategies in regional and development policies:

- intangible factors, like human capital and knowledge, and the 'operators' that could translate potential into actual growth projects;
- relational factors creating synergies, promoting co-operation and partnership, exploiting the richness of local relationships that define a productive 'vocation', local know-how and local culture: social and relational capital;
- advanced communication networks and communication services in order to gain a global reach on markets, information, business opportunities: public and club goods addressed to the efficiency of territory.

But also, and perhaps more importantly, a change in policy styles was seen as crucial. It resided in the goals of (Camagni 2008):

- preparing territories for innovation, enhancing their adaptability to a changing external context, promoting their openness and receptivity to new business ideas and organisational styles, rather than forcing the locational decisions of single firms;
- collecting the knowledge tacitly embedded in local entrepreneurship and local intermediate institutions, attracting them into the process of local strategic planning and design of new development projects in a cooperative game;

– negotiating the terms for fruitful co-operation between territories and firms, rather than just supplying favourable location factors;

– reinterpreting a bottom-up, 'generative' approach to development, rather than a top-down, 'competitive' one where regions and cities fight against each other to attract a given (and increasingly scarce) amount of public resources and private investments, in a zero-sum game.

These proposed goals and policy styles conveniently fit into the upper four boxes of Fig. 18.1, representing their possible normative counterparts. But the new hermeneutic approach adds a new symbolic dimension to the picture, requiring some extra elements to be kept in mind. These refer to the emotional and identitarian dimension of creative spaces and the socialized processes of recognition and appropriation of spaces themselves by local communities. These processes are difficult to replicate, and even to stimulate or enhance, using levers that almost necessarily depend on decisions external to the community. Creative milieus are in fact almost "invisible from outside" (Cusinato 2014). It is therefore difficult for them to become policy targets and recipients.

However, some important conditions for renewed policy styles in the hermeneutic perspective can be envisaged. The first concerns the process of policy design, which should be inclusive, being based on the empowerment of a floor, as wide as possible, of local stakeholders, institutions, associations and individuals. Citizens' participation in urban decision-making seems crucial: diffused imagination and grass-roots experience can be more easily given voice and translated into actual projects (Camagni 2011). Urban strategic planning can also gain creativity and robustness when it abandons the old-fashioned corporate-like procedures typical of the 1990s and acquires an inclusive character by promoting citizens' participation and public/private partnership (Healey 2001).

The second condition refers to the necessity to consider the physical dimension of places—not, of course, in the sense of the pure real estate business, as often happens when the construction or reconstruction of buildings and sites is involved. Public spaces play a important role in fostering interactions and casual encounters, providing opportunities for the self-organisation of movements, alliances, parties, associations (the Greek *agorà* and the Italian *piazza*). But also semi-public or 'club spaces' like the Roman *thermae*, the medieval monasteries, the post-medieval universities, the modern academies and also the recent hubs and airport lounges, edge cities, commercial and art galleries, congress centres and wharfs may perform the same functions, since they all share the same close attention to symbolic meanings, prestige messages, and images of friendly, inclusive and relaxing spaces.

The third condition regards the necessity to devise complex and integrated strategies in order to cope with the complex task of enhancing creativity. Nor in this field do mono-dimensional and simplistic recipes work. Acting on the provision of localised urban amenities in order to attract the 'creative class' (Florida 2005) and disregarding the activation of local knowledge and identities may perhaps enhance urban tourism, but it will not enhance knowledge and creativity. Urban policies can greatly help the creation of an urban atmosphere, particularly in some

places or districts which may be attractive to cultivated and creative people. But it is the pre-existing presence of these people that cumulatively adds vibrancy to these places, not vice-versa. Milan would have never attracted the talents working in the fashion world only thanks to the allure of the *Navigli* canals or of the central 'fashion *quadrilatero*', and without being the center of the highly integrated fashion, design and communication industry (magazines, advertising and commercial television). And the fashion industry would not be in Milan without its previous historical specialization in textiles, clothing, advanced textiles machines, followed by CAD-CAM technologies and complemented by international fairs, handicraft clothing production (e.g. for the *La Scala* opera performances), industrial design and... a touch of Italian taste (Camagni 2011). There is an evident path-dependency in such historical cases. It develops not just along pre-determined technological trajectories and proximities but also among often random cognitive proximities and within corresponding physical contexts.

The development of (and policy support for) cultural activities may be crucial in this picture in numerous respects. Firstly, in the education field, cultural activities help generate a special form of knowledge where curiosity and creativity are central. Secondly, they create the atmosphere, the attention, the enjoyment, and finally the willingness to pay for the products of human imagination and talent. Thirdly, they merge with other knowledge producing channels, such as scientific education, on-the-job learning, learning-by-cooperating, with outcomes that are highly conducive to creativity.

The fourth condition regards the necessary continuity of both policy interventions and targeted communities/stakeholders joining the innovation process. One-shot games generate opportunism rather than cooperation; they foster recombination and *bricolage* on existing information and consolidated knowledge, rather than reorientation of cognitive elements and exploration of new languages and codes. Policy-makers should be fully aware that they are acting on difficult and slow processes and not on-the-spot decisions.

The fifth condition has to do with the need to devise and pursue spatially differentiated strategies, not only in the sense of a necessary start from local specificities and vocations, from (micro) excellence fields and traditions, but also in the structural sense of the specificity of the cognitive 'patterns' present in the different spatial contexts. These patterns may be summarised and perhaps classified in a 'meso' dimension encompassing production structures (modern/traditional), technological *filières* (high-tech/low-tech), urban structure (large/small city), formal knowledge production (present/absent), thus enlarging the already proposed classification of "spatial innovation patterns" (Capello and Lenzi 2013). The identification of meaningful patterns is likely to suggest meaningful and differentiated general strategies for each of them, on which (micro) local specificities interpreted by local stakeholders could build appropriate and realistic innovative projects.

The strategy for achieving and enhancing urban creativity cannot but be a complex and integrated one. Utilising the concept of "territorial capital" (Camagni 2009), it should encompass and support three forms of capital—cognitive capital, relational capital, and environmental capital—and it should be managed with new governance styles.

Cognitive capital furnishes not just competence and know-how, but especially knowledge, learning-to-learn capacity, serendipity and, as a consequence, adaptability and an ability to drive change. A particular role should be attributed to the catalysts of knowledge exchange and interaction that are the 'knowledge creating services' supplied by professionals or by ad hoc structures, namely efficient science parks for technology transfer and adoption. Relational capital provides openness and trans-territorial linkages but also the capacity to cooperate with local and external partners and an exposure to novelty. Environmental capital encompasses all manifestations of physical capital, ranging from pure transport and communication infrastructure to urban settlement form and structure, from the presence of cultural heritage to the quality of the natural and built environment: all these elements impinge on local efficiency and potential. Concepts like Allen Scott's "creative field" (Scott 2006) or "creative milieu" seem particularly appropriate, because they suggest bringing together the three forms of territorial capital.

A crucial role is to be attributed to local governance. Owing to the frequency of market failures in the field of urban policies and the consequent need for the ex-ante coordination of actors, for collective action and the collective sanctioning of opportunistic behaviour, new governance styles are needed. They should address interaction and processes more than individual actors and individual decisions; be open to public/private partnership; and implement the creative management of cross externalities among the different competences, disciplines, functions, social groups and classes acting within the city (Camagni 2011).

18.4 Towards Some Conclusions

The hermeneutic approach intended to gain deeper understanding of the processes of knowledge creation that is proposed in Cusinato and Philippopoulos-Mihalopoulos's book is, in my opinion, a cognitive turn in the economic literature on innovation, and it may be a first step in the construction of a new scientific paradigm. It builds heavily on the achievements of a long-standing scientific trajectory addressing the role of space—and of local 'territory' in particular—in economic development and innovation processes, which ranges from the neo-Marshallian approach to 'district' areas (Becattini 1979), through the evolutionary approach to 'innovative milieus' (Camagni 1991), to the more recent elaborations on the cognitive role of cities (Rémy 2000; Camagni 2001) and the processes of knowledge creation (Cappellin and Wink 2009). On top of this trajectory the hermeneutic approach explores the sources of creativity and knowledge in depth, and it adds a symbolic-and-emotional dimension which links together places ('landscapes') and local collectivities, physical contexts and economic actors in a single process of knowledge creation. Cognitive codes are interchanged, recognized and reconstructed in a socialized process, showing the co-essential nature of knowledge and creativity.

The main message that emerges from these advances for innovation policies is that attention should be paid not just to traditional functional elements (human capital, externalities, or external linkages, although these maintain their

importance), but mainly to symbolic and cognitive elements (codes, representations, languages, values) replicating the ways in which individuals, groups and communities fully develop their creative potential through synergy, associative thinking, interaction and cooperation in meaningful and recognized places.

Since this concerns representations, mental and identitarian constructs, and cognitive codes, the task of policy-makers is not easy, and a drastic change in policy goals and styles is required. This change can be summarized as follows:

– policy strategies should assume an evolutionary character, backing the technological trajectory of each region: fostering convergences, complementarities, contaminations and cross-fertilizations with other sectors/technologies; boosting diversifications and branching; enhancing the adaptation capability of the existing regional knowledge base through the creative use of available territorial capital;
– the previous strategy cannot be implemented without the decentralisation of strategic planning and projects design through the involvement of local information, competence and knowledge and the engagement of intermediate institutions, local entrepreneurs, stakeholders and citizens. These actors should give rise to interactive participation and partnership processes of policy construction, including direct responsibility for implementation or co-financing;
– the 'bridging' role of some local forms of social capital, and of some tertiary activities in knowledge creation and exchange, should be supported and enhanced through appropriate incentives; public intervention and support should be addressed to interaction and cooperation processes and to joint projects rather than to individual actors; cooperation should also be solicited with partners external to the region/city (researchers, institutions providing existing appropriate knowledge);
– a place-based policy should not only emerge bottom-up from the above mentioned processes; it should also target local places, supporting processes of empowerment, recognition and identity construction around symbolic spaces;
– knowledge creation should be directly targeted: increasing the sources and scope of 'analytic', general purpose local knowledge; widening the application fields of this knowledge ('synthetic' knowledge in the sense of Asheim et al. 2011); importing the knowledge which is lacking through co-operation agreements and inflows of specialists and researchers; merging analytic/synthetic knowledge with artistic knowledge;
– prizing creativity in all its forms.

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Integrated Spatial Planning: Why and How? **19**

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19.1 Spatial Planning and Sustainability: A Bi-directional Relationship

The main goal of spatial planning may be indicated in the achievement of territorial sustainability. This goal defines the general and prospective role of spatial planning in a modern and aware society: spatial planning represents the appropriate institutional, technical and policy context for managing the territorial dimension of sustainability.

Sustainable development in fact, intended as a policy goal, bears different dimensions: the technological dimension, the behavioural (linked to life-styles in affluent societies), the diplomatic (referring to the international strategies to assure cooperation among countries at different development levels, with different development expectations) and the territorial one, referring to an ordered, resource efficient and environmental-friendly spatial distribution of human activities.
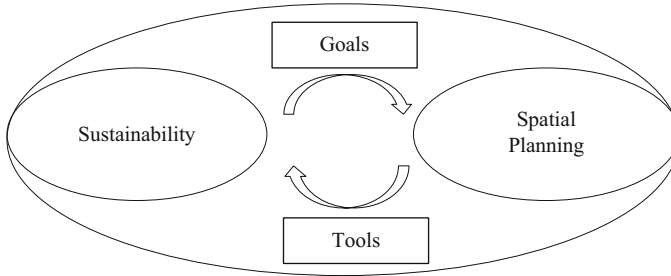
Spatial planning takes care of this last dimension of sustainability, and establishes with the sustainability issue a bidirectional logical relationship (Fig. 19.1); namely:

– sustainability provides the general goal to spatial planning;

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Fig. 19.1 The sustainability-planning relationship

– spatial planning provides the major institutional context and effective policy
   tools to attain territorial sustainability, thus strengthening the concept and
   allowing it to be translated into an effective action.

This bi-directional relationship appears as conceptually sound due to the integrated,
multi-sectoral nature of both elements:

– sustainability derives from a positive, synergetic co-evolution of the economic,
   social, environmental and cultural dimensions of the society;
– spatial planning finds its raison d'être in the necessary integration of the
   different policy tools which have an impact on the territory.

19.2   The Integrated, Multisectoral Nature of Spatial Planning: Why?

The integrated, multidimensional nature of the sustainability concept provides the
first rationale for the necessity of an integrated approach to spatial planning.
But other elements push in the same direction, namely:

– the fragmentation of decision-making powers, both in the public and the private
   spheres, with a diffused presence of veto powers. This fact calls for the necessity
   of integration and co-operation, both vertical and horizontal, between the differ-
   ent tiers of the public government structures (usually engaged in different policy
   fields) and between the different departments of the same administration imping-
   ing on the territory;
– the evidence of growing problems and concerns in specific territorial contexts,
   which call for complex, multidimensional interventions: metropolitan develop-
   ment, peri-urban settlement structure, coastal development, development
   through wide industrial corridors, sensitive environments like mountain areas
   crossed by international mobility corridors. What really matters is the overall
   result of an equilibrated spatial development process, not the single dimensions
   through which such an equilibrium can be reached (infrastructure efficiency,
   proper land-use, smart development policies).

19.3   The Goals of an Integrated Spatial Planning Practice

The main objectives of a strategy of territorial sustainability, to be reached through integrated spatial planning practices, may be identified in the following (Fig. 19.2):

– territorial quality: the quality of the living and working environment; the relative homogeneity of living standards across territories;
– territorial efficiency: resource-efficiency with respect to energy, land and natural resources; competitiveness and attractiveness;
– territorial identity: enhancing "social capital"; developing a shared vision of the future; safeguarding specificities, strengthening productive "vocations" and competitive advantage.

These objectives may be reached through an integrated approach, securing the positive co-evolution of the different subsystems that build up the territorial realm: this means maximising the synergies and the positive cross-externalities from each sub-system and all the others, and minimising the negative externalities. As an example among others: economic development in peripheral areas may be advantageous to the environment if a long term perspective on the use of local natural resources is taken up and if it provides the (public) financial resources that may be channelled towards the betterment of environmental infrastructure; at the same time it may guarantee the permanence of the local population and the strengthening of its production culture and sense of belonging.

Territorial efficiency, quality and identity represent objectives and values in themselves; any modern society cannot do without them, as they are at the base of local collective wellbeing. But they are at the same time preconditions for local competitiveness and no conflict exists in this sense between the needs of local population and the needs of the economic fabric, at least in the long run.

19.4   New Challenges and New Responsibilities for Spatial Planning

The main challenges facing a renewed approach to spatial planning may be presented as follows:

– helping the re-establishment of a legitimacy of public action, through transparency of procedures, accountability to local populations and proper results on territorial quality;
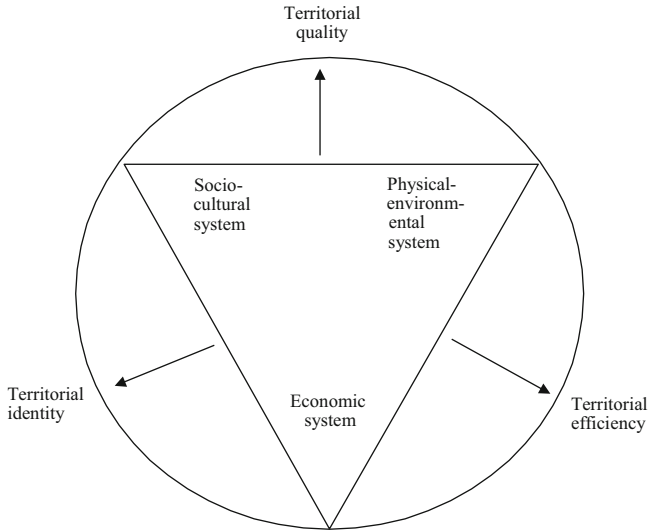
Fig. 19.2 An integrated strategy for territorial sustainability. *Territorial quality*: quality of living and working conditions; relative homogeneity of living standard s across territories. *Territorial efficiency*: resource efficiency with respect to energy, land and natural resources; competitiveness and attractiveness. *Territorial identity*: enhancing social capital: developing a shared vision of the future; safeguarding specificities, strengthening productive "vocations" and competitive advantage

– overcoming the limits of traditional planning practices, mainly addressed to the design of spatial forms and structures more than to the definition of rules, guiding principles and processes; overcoming the rigidity of traditional procedures and their strict, hierarchical structure in favour of a superior flexibility; favouring the effectiveness of the general process of spatial development more than the conformance to abstract schemes. A general consensus exists about the fact that rigidity has not guaranteed territorial quality, but only position and bureaucratic rents;

– contributing to European integration and enlargement processes, through appropriate physical planning tools;

– rehabilitating the image and the practice of planning in general in eastern European countries, where, after the political transition, a very critical attitude is generally taken-up as a result of understandable but purely political reactions to the ancient regime;

– the limits of opposite and extreme attitudes towards deregulation and liberalisation are now apparent, and call for more equilibrated and modern approaches;

– developing new forms of non-hierarchical co-ordination within the public administration;

– enhancing the development of advanced and effective forms of citizens' participation to the decision-making process on territorial projects.

19.5   The Main Principles on Which a Renewed Spatial Planning Approach May Be Built

19.5.1 The Principle of Horizontal Integration

This principle defines the necessary integrated nature of spatial planning, in the sense that the consistency of different sectoral policy tools that impinge on the territorial structure has to be crucially guaranteed. In more general terms, we have already underlined the necessity of a unitary and integrated vision of the social, economic, environmental and cultural development processes. But referring more directly to the dimension of physical planning, a different and perhaps more crucial integration emerges: the integration among policy-making processes which affect the territory through sectoral policy tools, namely:

– settlement policies (urban planning, location decisions of large urban functions: shopping centres, fairs, logistic platforms, waste treatment plants);
– infrastructure policies, mainly referring to transport and energy policies;
– environmental policies, putting limits to use of land and natural resources;
– landscape policies.

Only the integration and the territorial consistency of these policies may guarantee the achievement of equilibrated and sustainable processes of territorial transformation, namely (Fig. 19.3):

– sustainable transport infrastructure, well integrated in the landscape and respectful of the integrity of open spaces;
– efficient urban systems, well equipped with mobility infrastructure, both inside and outside the single urban centres, where transport supply (and in particular public mass transport infrastructure) is used to direct the development of the settlement system;
– appropriate urban form, avoiding or limiting the spread of low density settlement structures, which maximise land consumption and private car commuting;
– new forms of rural/urban integration, interaction, co-operation, avoiding traditional land-use conflicts and dependence and enhancing the respective role and identity.

19.5.2 The Principle of Vertical Integration

The principle refers to the necessary cooperation of the different institutional levels of the planning process. The subsidiarity principle provides the logical framework for building a bottom-up planning process, with crucial roles assigned to the lower levels of the institutional structure, but also with specific responsibilities attributed
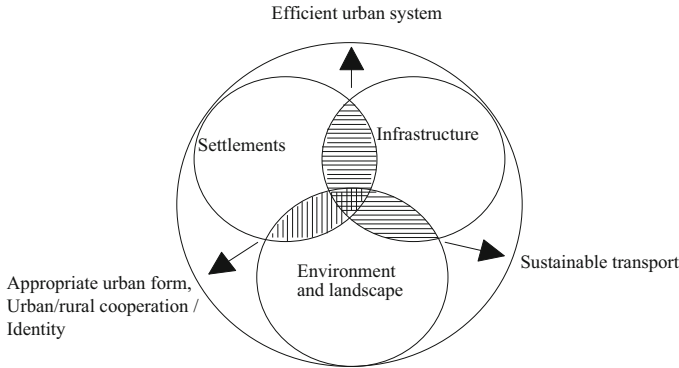
Fig. 19.3 An integrated planning approach

to the upper levels. In this regard, in fact, we have to bear in mind the efficiency requirement of any devolution of decision-making responsibility to lower levels of government, explicitly present in the subsidiarity principle; this element necessarily attributes responsibilities and competencies to the supra-municipal level in case of:

– presence of transborder effects of local decisions (environmental externalities on other municipalities; e.g.: the mobility generated by big shopping centres);
– presence of supra-local interests served by wide area projects: typically infrastructure networks or big projects requesting territorial continuity (parks);
– presence of a "network surplus" generated by inter-municipal co-operation and synergy (the co-operation being sometimes the result of spontaneous processes but often requiring a superior co-ordination, some financial incentive or regulatory enforcement).

Wide-area planning is needed for the efficient management of these cases, and the intermediate, third level, government institutions (like provinces, counties or departments) prove effective to perform this task.

19.5.3 The Principle of Policy Anticipation

Anticipatory practices addressed to the implementation of an ex-ante co-ordination of decisions instead of an ex-post adjustment to decisions already taken proves a very effective institutional strategy. Spatial planning in particular may achieve important results with respect to sectoral planning if co-ordination with other planning bodies is anticipated, and some assets (land purchases) or tools are prepared beforehand.

19.5.4 The Principle of Market Resort

The largest use of market mechanisms should be experimented before resolving to use regulatory practices or turn to public intervention, when public interest is not at risk. "Markets corrected for externalities" may achieve better, wider and cheaper results than regulations; resort to private project financing for the provision of services or infrastructure may save public money for the cases when public intervention is unavoidable; stimulate private creativeness and project proposals may prove more effective than guiding everything from the government. Private/public partnerships may be used in many cases in which private efficiency and public control may merge positively and effectively.

19.5.5 The Visioning Principle

"Shared visions" or "concepts" for territories have to be provided, activating the widest participation and public debates; these elements work in fact as catalysts of creativeness for territorial projects, sources of social cohesion and sense of belonging, activators of mutual trust and synergetic attitudes, symbolic guidance for individual behaviour. The process of creation of such visions and concepts through citizens participation and the transparent engagement of vested interests is probably the most interesting novelty in planning practices in the last decade; it may be synthetically conceived as a process of creation of "social capital", an element which is more and more mentioned in the literature on spatial development as the basic social precondition for territorial success.

19.6   New Styles in Spatial Planning

A new style in developing and delivering spatial planning is necessary to cope with the new challenges and the new goals.

Soft and flexible planning tools are needed, contrasting previous traditional attitudes in favour of rigid and holistic regulatory tools. The growing complexity of territorial processes and the width of global interdependencies; the rising uncertainty on spatial trends and on cause-effect logical chains; the limits of control capability of the public domain, and its fiscal crisis; all these elements call for new planning styles, addressed towards the definition of guiding principles and rules rather than regulations, and more attentive to processes rather than territorial design, open to participation and partnership rather than relying on technocratic imposition.

The modern plan shall become:

– a system of rules;
– an effort to understand and anticipate future territorial trends and effects;

– a general framework for the ex-ante co-ordination of the territorial impact of the multiple public decisions that impinge on a given space;
– a strategic tool, addressed to the activation of the private project-building capability, realisation of synergies between the private and public spheres, orientation of new activities towards shared goals, respect of widely accepted values.

In order to implement this new planning style without jeopardising the sustainability goal, some preconditions are requested and new functions have to be accomplished by the planning authority. In particular, it is necessary to strengthen the evaluation function and to make the evaluation procedure at the same time more effective, authoritative and transparent. This function in fact should complement the entire planning process, intervening in all phases going from the definition of policy goals and strategies to the design of territorial projects; in parallel to the multidimensional nature of the sustainability goal, evaluation should be in a measure to integrate different and sometimes contrasting policy objectives, mediating the interests and the needs of different parts of the local society.

Strengthening of the evaluation capability by the public administration, incorporating and interpreting the values and expectations of the local society, represents the natural counterpart of the wider role attributed to the private sector in spatial development.

Secondly, procedures and tools should be designed and implemented in order to guarantee the openness of the public administration to the citizens' "voice" and effective participation processes. An equilibrium should be maintained between "vested" or organised interests and weak or diffused ones, lacking visibility or communication capability.

Thirdly, in order to implement the necessary co-ordination procedures between different levels and sectors of the public administration, effective decision-making procedures should be designed, limiting hierarchical enforcement tools to a minimum. Relationships between different government levels should be based on consensus rather than power, incentive rather than enforcement, authoritative arguments rather than authority. The collective territorial interest should be more and more defended by shared values and by a strong planning culture, reaching the smallest municipality, rather than through hierarchical veto powers. The latter should be probably maintained, but less and less utilised.

Territorial Impact Assessment (TIA): A Methodological Proposal

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20.1 Introduction

The need to engage European research and institutions in the new field of Territorial Impact Assessment, from both a methodological and a procedural perspective, was stated some years ago by the ESDP—European Spatial Development Perspective (CMSP 1999). The necessity of multidimensional evaluation of the likely impact of policies and programmes on the territory—understood as the dimension on which all the other relevant dimensions (economic, social, environmental and cultural) converge and with which they integrate—emerged as a natural consequence of the importance of spatial aspects in the future development of the Union and of widespread preoccupations about certain emerging spatial trends.

This recommendation was subsequently strengthened by the Commission's proposal to include "territorial cohesion" as a major objective of regional policies (CEC 2004a), and *a fortiori* by the inclusion of territorial cohesion among the main goals of the Union, together with economic and social cohesion, in the draft European Constitution approved by the European Ministers in Rome on June 2004. As a consequence, the task of developing an operational approach to TIA was assigned by the Commission to the ESPON Programme, the European Spatial Planning Observation Network, and included in the terms of reference of many ESPON projects.

A proposal for a TIA methodology combining logical consistency *vis-à-vis* the Union's present institutional and policy guidelines with operational viability is

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being developed and applied by this author as part of the ESPON project 3.2 dealing with "Spatial scenarios and orientations in relation to the ESPD and cohesion policy".[1] The main features of this proposal are presented below.

20.2 Territorial Impact Assessment: The Institutional Commitment

The need to develop a consistent methodology for TIA emerged during preparation of the ESDP documents, 1995–1999. The final ESDP draft, approved by the Ministers of Spatial Planning in 1999 (CMSP 1999), refers to TIA in many respects, and in particular in cases where a difficult balance must be struck among different preference or decision dimensions. In the sphere of transport policies, confronted with an accessibility/environment trade-off but also with the challenge of a spatially equilibrated infrastructure endowment and provision, the draft states: "Comprehensive integrated spatial development strategies" are needed, and "in the future, *territorial impact assessment* should be the basic prerequisite for all large transport projects" (par. 109). In the sphere of natural resource management, where a wise balancing of protection and development is required: "The conservation and management of natural resources call for appropriate integrated development strategies and planning concepts as well as suitable forms of management. This ensures that nature conservation and the improvement of living conditions of people are taken into consideration equally. *Spatial and environmental impact assessment* can provide the necessary information basis for this" (par. 138). In the sphere of water resource management, where surface and ground water policies should integrate with preventive measures for the reduction of waste water and careful spatial and land use planning: "The impact of large water exploitation-related projects should be examined through *territorial and environmental impact assessment*" (par. 145). In all these three cases, TIA is recommended explicitly in the policy options paragraphs (policy options nos. 29, 42, 52), and in a final recommendation: "Member States should intensify the exchange of experience on *territorial impact assessment*" (par. 185).

The commitment to developing a coherent methodology for TIA was reiterated at the Informal Ministerial Meeting in Tampere, September 1999, with the *ESDP Action Programme*. Three Strands of Action were decided, and within the first strand, centred on the promotion of "a spatial dimension in Community and national policies", the action concerning *Territorial Impact Assessment* states: "*The development of a common concept for territorial impact assessment (TIA) is necessary to support spatial development policies. The concept shall be of a cross-sectoral nature and include socio-economic, environmental and cultural indicators*

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[1]The general features of the proposed approach were presented by the ESPON 3.2 coordinator at the ESPON Conference in Manchester, 6–8 November 2005, and in more detail by the author at the ESPON Workshop on TIA in Brussels, 12–13 January 2006.

for the territory in question". Three features should be stressed: the fact that no common concept exists at present; the multisectoral nature of the methodological approach; the fact that impact should refer to specific territories, those addressed by development policies, and not just to the general EU territory.

Along similar lines, in 2002 the Commission introduced a new Impact Assessment (IA) procedure designed to contribute to the more coherent implementation of the Sustainable Development Strategy through assessment of the potential impact of policy options (CEC 2002), subsequently applied to a number of Commission proposals. Impact assessment is conceived as "a set of logical steps which structure the preparation of policy proposals" at the European level (CEC 2005, p. 4), cutting across and integrating different sectors and dimensions (economic, environmental and social) and replacing all previous single-sector type assessments (environmental, gender, business, health assessments) (CEC 2004b). The general goal of integrating the different dimensions on which impacts may be evaluated, going beyond Strategic Environmental Assessment and other mono-dimensional assessment tools, is similar to that pursued by the TIA. The main difference regards the aggregate perspective in terms of territorial impacts of IA, because its main level is comprehensive and Europe-wide, with indications only of differential impacts on specific typologies of regions (e.g. urban/rural) (CEC 2004b, p. 11), while TIA should apply to both the general and the specific territorial level.

20.3   Territorial Cohesion: The New Major Objective of the Union

"Territorial cohesion" as a major objective of the Union was proposed by the Commission in February 2004, in its Third Report on economic and social cohesion (CEC 2004b), and authoritatively relaunched by the draft Constitution of the Union approved by the Council of Ministers at the end of June 2004: "*The Union... shall promote economic, social and territorial cohesion...*" (article I-3).[2]

This indication indubitably increases the need for a sound TIA methodology, and the new concept of territorial cohesion should be taken as its main benchmark.

Unfortunately, the concept of 'territorial cohesion' is still somewhat vague and requires clarification and logical consistency. In the Third Cohesion Report, the Commission uses the term as a synonym for "more balanced development", for "territorial balance", or for "avoiding territorial imbalances" (CEC 2004b, p. 27), elements that do not add much in definitional terms. As a further objective, the Commission states that "the concern is also to improve territorial integration and encourage cooperation between regions", which although an important indication, may be given a secondary ranking in terms of policy priorities.

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[2]The importance of including this concept is further emphasised by the statement that, in the area of territorial cohesion, the Union has a '*shared competence*' with Member States (art. I-14.2).

More telling is the subsequent specification of the aspects encompassed by the new concept at the different territorial levels: excessive concentration of economic activity and population in the European "pentagon"; an imbalance between the main metropolitan areas and the rest of countries; growing congestion and pollution and the persistence of social exclusion in the main conurbations; the presence of rural areas suffering from inadequate economic links and peripherality; the sprawling nature of urban growth; the accumulation of natural and geographical handicaps in outermost areas.

More thorough treatment of the concept of territorial cohesion has been provided by DG Regio in a subsequent report (CEC 2004c) devoted specifically to the subject and drawing on the early results of the ESPON program and of other Commission studies. Here territorial cohesion is considered as complementary to economic and social cohesion, meaning "the balanced distribution of human activities across the Union"; more importantly, "it translates the goal of sustainable and balanced development assigned to the Union into territorial terms" (CEC 2004c, p. 3). The subsequent exemplification of the fields of application is similar to that furnished by the main Cohesion Report.

Subsequent policy documents and political statements on the subject have not developed the concept any further. The Presidency conclusions of the Informal Ministerial Meeting in Rotterdam (November 2004), explicitly devoted to territorial cohesion, states in fact that "... territorial cohesion adds to the concept of economic and social cohesion by translating the fundamental EU goal of balanced and sustainable development into a territorial setting" (Dutch Presidency 2004). Despite the persisting fuzziness of the concept, the reference to a "territorial setting" allowed Ministers to engage until 2007 in proper identification of "...the contribution of integrated spatial development approaches towards enabling regions and cities to exploit their potentials more effectively": the reference is to a future document on "the Territorial State of the Union", a second ESDP with a stronger policy emphasis.

The Scoping Document on this new perspective was presented at the Informal Ministerial Meeting in Luxembourg, May 2005 (Luxembourg Presidency 2005). The definition of territorial cohesion remained the same, but it acquired a new "practical" meaning when it was included in a direct policy frame: "In practical terms territorial cohesion implies: *focusing regional and national territorial development policies* on better exploiting regional potentials and territorial capital—Europe's territorial and cultural diversity; *better positioning of regions in Europe* ......facilitating their connectivity and territorial integration; and *promoting the coherence of EU policies with a territorial impact*...." (p. I; emphasis in the text).

This passage contains a number of significant innovations. First, traditional "spatial development" policies are called "territorial", using a neologism in the English language that suggests the exploitation of territorial specificities going beyond pure location and distance in space. Second, the concept of territorial capital is used for the first time, implicitly underlining the fact that territory is a resource that potentially generates productivity increases ("higher return for specific kinds of investment") and utility flows to local communities.

20.4 Territorial Cohesion: A Theoretical and Operational Definition

It is this author's opinion that, if the concept of territorial cohesion is to add to the content of economic and social cohesion, it must necessarily be linked with the sustainability issue. In short, *territorial cohesion may be seen as the territorial dimension of sustainability*. Like the concept of sustainability, it has a positive and a normative connotation at the same time (i.e., it defines a condition and a policy goal) and operates by integrating different dimensions: economic, social and environmental (Camagni 2005).

The preceding definition may be explained in the following way. Considering both the positive and the normative sides, sustainability conditions and goals refer to four main (policy) dimensions (Camagni 1998):

– the *technological dimension* governing production processes;
– the *behavioral dimension* determining life-styles, consumption habits and also organizational models of production (e.g. transport intensive models like just-in-time);
– the *diplomatic dimension* referring to international strategies to assure co-operation among countries at different development levels, with different development expectations; and
– the *territorial dimension* residing in an ordered, resource-efficient and environment-friendly spatial distribution of human activities.

I maintain that territorial cohesion refers directly to the last dimension. On elaborating this point further, we can envisage three main components/objectives of territorial cohesion, namely:

– *territorial efficiency*: resource-efficiency with respect to energy, land and natural resources; competitiveness of the economic system and attractiveness of the local territory; internal and external accessibility;
– *territorial quality*: the quality of the living and working environment; comparable living standards across territories; similar access to services of general interest and to knowledge;
– *territorial identity*: presence of "social capital"; ability to develop shared visions of the future; local know-how and specificities, productive "vocations" and competitive advantage of each territory.

These objectives may be achieved through an integrated approach which ensures the virtuous integration and positive co-evolution of the three main territorial sub-systems—economic, social and physical-natural—in their spatial manifestation or phenomenology. This means maximizing synergies and positive cross-externalities between each sub-system and all the others, and minimizing negative externalities (Camagni 1998). The integrated, multidimensional nature of the
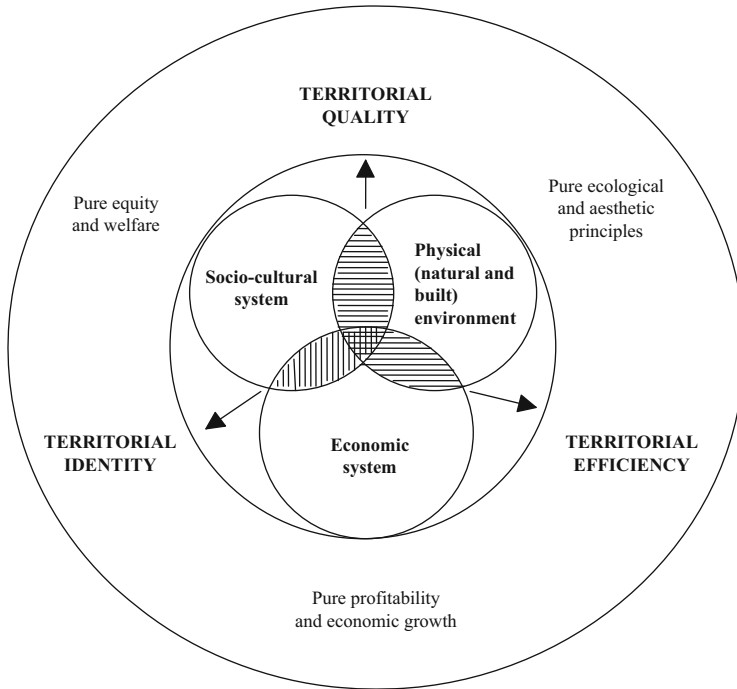
Fig. 20.1 The dimensions of territorial cohesion

sustainability concept provides a rationale for an integrated approach to territorial cohesion policies (Fig. 20.1).

Territorial efficiency, quality, and identity are objectives and values in themselves; no modern society can do without them, for they are the basis of local collective well-being. But at the same time they are preconditions for local competitiveness, and no conflict exists in this sense between the needs of the local population and the needs of the economic system, at least in the long run. This element has been conceptually utilized by recent EC documents in order to justify compliance and consistency between cohesion policies and the Lisbon strategy.

While the first two objectives are rather familiar, the third, namely territorial identity, may be rather surprising. Yet I believe that it is crucial and that it will become increasingly central to European policies. Territorial identities incorporated in local culture, know-how, social capital and landscape are the basic constituents of the territorial realm because they simultaneously:

– represent the ultimate 'glue' of local societies;
– are linked with the spatial division of labour and in many cases determine its evolution;

Quality of life and working conditions; access to services of general interest

Conservation of natural resources
Conservation of water resources

Conservation and creative management of natural landscape

Quality of services

Sustainable transport: share of public transport and reduction of congestion on the network

Integrated and balanced territorial system

Territorial quality

Reduction of environmental risks

Multiethnic solidarity and integration

Efficient and polycentric urban system

Reduction of poverty and exclusion

Soc **Env**

Compact city form; reduction of sprawl

Co-operation between city and countryside

Accessibility to infrastructure

Complementarity of knowledge and Know-how

Territorial identity

Ec

Territorial efficiency

Conservation and creative management of cultural resources

Economic performance

Resource-efficiency
Competitiveness, attractiveness

Social capital; shared visions

Financial costs and benefits of policies

Inter-regional integration

Employment performance

Strengthening of gateway cities

Accessibility to telecommunication services and to knowledge

Quality of transport services

Fig. 20.2 An integrated strategy for territorial cohesion: objectives and assessment criteria

– facilitate processes of collective learning and consequently boost the efficiency of the local production system (Camagni 2002).[3]

Which territorial issues warrant attention in the context of territorial efficiency/ quality/identity? They may be found and described particularly in the ESDP, and may be summarized as in Fig. 20.2. Reference to the main ESDP goals is obligatory for any TIA methodology.

20.5 The TEQUILA Model: A Proposed TIA Methodology

The foregoing discussion can be used as the basis to propose an operational model for Territorial Impact Assessment which comprises the following characteristics:

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[3]The already-mentioned Scoping document of the Luxembourg Presidency (2005) indicates natural but also cultural values as part of the endogenous potential of areas that should be fully exploited. To be noted is that the ESDP begins and ends with reference to culture, cultural variety and cultural heritage as characteristic features of the European territorial identity.

A. the TIA methodology should enable integrated assessment of the territorial effects of policies, programmes and broad integrated projects at different spatial levels, in particular the general EU level and the regional one;

B. the TIA methodology must necessarily link with the concept of territorial cohesion. The theoretical definition of TC and its three main dimensions are the basic elements on which to build the assessment methodology: the TEQUILA Model—**T**erritorial **E**fficiency **Qu**ality **I**dentity **L**ayered **A**ssessment Model;

C. TEQUILA is a Multicriteria Model; given the multiplicity of the "dimensions" of territory, this well-known assessment approach seems the most appropriate. The three dimensions of the TC concept and their sub-components become the *criteria* in the assessment model;

D. the *weights* of the three dimensions and sub-components are defined in a multiple and flexible manner through internal expert discussion, discussion within the ESPON Monitoring Committee or DG XVI, or Delphi inquiries. In principle, they should not vary with respect to the policies analysed. Assessment experiments should be conducted to test the sensitivity of the results to change in weights;

E. the general impact of EU policies on each dimension/criterion should be defined using ad hoc studies and/or expert judgements. Cause/effect relations should be carefully inspected;

F. the method accommodates, in consistent and statistically sound manner, both qualitative and quantitative impacts (see point K). Qualitative impact scores are attributed on a +5 to −5 scale: 5 = very high advantage for all; 4 = high advantage for all; 3 = high advantage for some, medium advantage for all; 2 = medium advantage; 1 = low advantage; 0 = nil impact; −1 = low disadvantage; −2 = medium disadvantage; −3 = high disadvantage for some, medium disadvantage for all; −4 = high disadvantage for all; −5 = very high disadvantage for all;

G. the TEQUILA model furnishes a first *General Assessment* (GA) of the impact of EU policies on the overall European territory (1st layer). This assessment refers to a general, abstract territory, and the impact on each criterion (c) may be seen as a "potential impact" (PIM):

$$GA = \Sigma c \; \theta c. \; PIMc \qquad \text{where}$$
$$\theta c = \text{weight of the c criterion}$$
$$PIM = \text{potential impact of policy (abstract)}$$

A GA is performed for each of the three dimensions (efficiency, quality, identity). An overall GA can then be performed, provided that the relative weights of the three dimensions are defined;

H. the preceding "general" assessment must be made truly "territorial" by considering the specificities of the single European regions, given that:
   – the *impact* may differ according to regional specificities
   – the *intensity* of the policy application may be different in different regions

- the *relevance* of the different "criteria" of the assessment method is likely to be different for different regions (e.g.: the same increase in income has a different significance according to the development level already achieved by an individual region);
- a region may not be subject to a specific policy;

I. a *Territorial Impact* model is built to assess the impact on single regions r (2nd layer). It is designed to be simple, operational and relatively user-friendly:

$$TIMr = \Sigma c \; \theta c \cdot Sr,c \cdot (PIMc \cdot PIr) \cdot PAr$$
TIM = territorial impact (for each dimension : efficiency, quality, identity)

c = criterion of the multi-criteria method
r = region
θc = weight of the c criterion $\quad\quad\quad\quad\quad\quad$ $0 \leq \theta c \leq 1;$ $\quad\quad$ $\Sigma c \; \theta c = 1$
Sr,c = sensitivity of region r to criterion c $\quad$ $0 \leq Sr, c \leq 1$
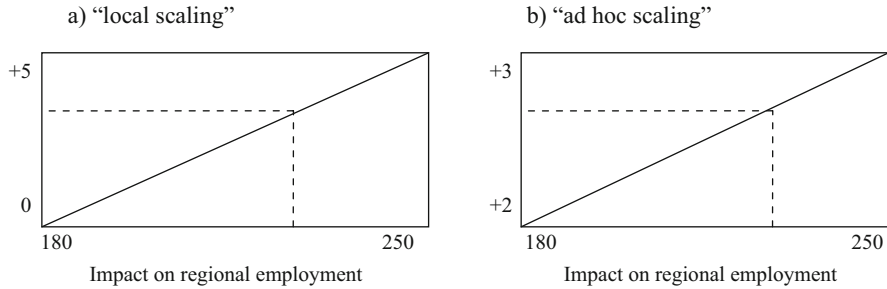PIM = potential impact of policy (abstract) $\quad$ $-5 \leq PIMc \leq +5$ (in qualitative analyses)
PI = policy intensity (in region r)
PA = policy applicability (a 0/1 variable)

J. the rationale for the previous equation is the following: as in risk assessment, where *risk = hazard* (potential risk) x *vulnerability*, here the territorial impact is the product of a *potential impact* (PIM) times a *sensitivity* indicator. In its turn, Sr,c is a vector (weighted sum) of regional characteristics defining two main elements: vulnerability to impact (mainly geographic indicators)[4] and desirability of the dimension/criterion (technically a utility function, mainly socio-economic indicators) of region r;

K. the term (PIMc . PIr) in the equation is the equivalent in the qualitative scoring of a quantitative impact assessed using a quantitative external model (e.g. the impact of transport policies on regional accessibility). In this latter case, as quantitative impacts are defined in their own specific measurement units and scales, they are translated into a value score on the +5/−5 scale. Two different methods may be used: assigning to the +5/−5 (or 5/0) scale respectively the minimum and maximum *expected* or *likely* values ("global scaling") or the minimum and maximum values *currently obtained*. A third method is also suggested, similar to "global scaling" This we may call "ad hoc scaling" and is more consistent and transparent in the present statistical framework: assigning the current values of the impact to a restricted scale defined within the abstract +5/−5 scale according to a subjective judgement on the absolute importance of the impacts assessed. In fact, these impacts on the single regions may well belong to a small "qualitative" interval, and it would be unwise to

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[4]Vulnerability refers to negative impacts; for positive impacts the right term is "absorptive capacity".

a) "local scaling"   b) "ad hoc scaling"

+5   +3

0   +2
180   250   180   250
Impact on regional employment   Impact on regional employment

Fig. 20.3 Alternative scaling from quantitative to qualitative assessment

assign them to a scale ranging from an absolute minimum to an absolute maximum (Fig. 20.3);[5]

L. the criteria/objectives within each of the three dimensions of TC may be tentatively listed as the following (see Fig. 20.2):

Territorial efficiency:
– efficient and polycentric urban system (*);
– inter-regional integration (*);
– resource efficiency: consumption of energy, land, water. . .;
– general accessibility, infrastructure endowment;
– competitiveness of production system;
– sustainable transport: share of public transport and absence of congestion;
– development of city-networks and medium size cities;
– compact city form, reduction of sprawl;
– reduction of technological and environmental risk.

[5]In Fig. 20.3, the same impact of a policy proposal on employment in the different European regions could be translated into the +5/0 scale (positive impact) by assigning the minimum and maximum values respectively to 0 and +5, or, more wisely, given the proximity of values and the reduced size of the impact distribution, to a proper, subjectively defined, +3/+2 scale. In this case, the arithmetic of the exercise is the following:

$$y_i = y_{min} + (y_{max} - y_{min}) \frac{x_i - x_{min}}{x_{max} - x_{min}}$$

where :

y_i = score on the (continuous) qualitative scale
y_{min} = minimum value of the qualitative scale (defined by the evaluator)
y_{max} = maximum value of the qualitative scale (defined by the evaluator)
x_i = value of current impact
x_{max} = maximun value of current impact (quantitative)
x_{min} = minimum value of current impact (quantitative)

Territorial quality:
– reduction of interregional income disparities (*);
– conservation and creative management of natural resources;
– access to services of general interest;
– quality of life and working conditions;
– quality of transport and communication services, safety;
– reduction of emissions;
– attractiveness for external firms;
– reduction of poverty and exclusion;
– multiethnic solidarity and integration;
– employment performance.

Territorial identity:
– conservation and creative management of cultural heritage;
– quality of urban and rural landscapes;
– cooperation between city and coutryside;
– development of region-specific know-how and knowledge;
– accessibility to global knowledge and creative "blending" with local knowledge;
– development of territorial "vocations" and "visions";
– development of social capital; shared behavioural rules.

Some of these are activated only when certain kinds of policy proposals are considered; others are activated only in the General Assessment model, and not in the territorial one, because they refer to interregional conditions (integration, disparities, etc.) (indicated with a * in the list). The list of criteria/objectives should be carefully inspected in order to control for completeness, independence and double counting.

M. Given the present data availability, TIM could be performed al Nuts 3 level, and the results easily mapped.

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Part IV

An Inspiring Mind:
The First Generation of Scholars

An Inspiring Mind, a Trustworthy Human Being

21

Roberta Capello

In the introductory chapter to this book, my aim was to provide a picture of the impressive seminal scientific ideas developed by Roberto Camagni in his 45 years of work. I dedicate these few pages to providing instead an insight into the research method that Roberto has taught me during our long scientific journey together.

I started working with Roberto when preparing my first degree dissertation in 1985 at Bocconi University in Milan. From the outset, I was attracted by his impressive mix of seriousness and light-heartened attitude in doing research, by his scientific creativity, by his capacity to lead groups of people with a gentle but firm hand, and by his deep optimism, even in face of difficult tasks and heavy work.

Roberto has been first of all an inspiring mind in my scientific life. I learnt from his creativity, enthusiasm and passion to discover the unknown, as well as the arts of diplomacy and leadership necessary when one achieves top positions. I learnt how to develop clear and measurable definitions on many complex, vague and fuzzy concepts, how to formulate new interpretative paradigms on complex phenomena, how to develop a strict logic with which to reply to rather complex questions, how to conceptualise and present complicated aspects through synthetic and clarifying taxonomies, how to be optimistic in approaching what could at first glance be interpreted as a "mission impossible" like writing a textbook. But especially, I learnt a specific attitude and method in doing scientific research, which, after 32 years of common work, have become the "dogma" of our school.

Roberto has always rejected an "art pour l'art" approach. Abstract theoretical models and pure methodological exercises with no utility in solving real problems have never captured his interest. The identification of a real problem has always been the starting point of our researches, to be solved and studied through rigorous theoretical models and sound scientific methodologies. At the same time, Roberto has always rejected inductive, empirical, not theoretically grounded approaches,

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often lacking a clear logical reasoning, in search of replies through anecdotes that cannot easily be generalised. Theoretical and conceptual approaches, abstract models and sound scientific methodologies have always been interpreted by Roberto as tools necessary for a researcher to apply a rigorous logical cause-effect chain in the reasoning, the only ones able to lead to a solid result. A deductive approach has always characterised our research activity; an approach which has allowed us to get the maximum out of the data analysis we developed, having what we were looking for clearly in mind.

Roberto has always rejected a "copy and paste" approach, with the result that we have never produced two pieces of research based on the same idea. In whatever type of research (scientific or "market-oriented" research) that we have produced, the value added of new ideas, methods, and databases has always been immense. The result of this approach has always been an output with a high scientific value added. In case of commercial researches, the scientific value has always turned out to be much higher than what we were paid for. But we never cared: the personal satisfaction from understanding a small piece of science was the true value added for us.

Roberto has always rejected homogeneisation to others' theories and approaches; existing studies, both orthodox and heterodox, had to be deeply known and studied, since they had to be a starting point from which to develop our own approach.[1] With this behaviour, our ideas have always been strongly rooted in the updated literature; however, they have always been enriched with our personal value, a trade-mark which could be referred to as typical of our "school".

Roberto has always rejected "public shows" just for the sake of "being present". His public speeches have always been carefully planned, full of ideas with which to fascinate the audience. Without these ingredients, it would not be worth delivering a speech. The result has always been a huge effort in preparing public talks, which, however, have always been sources of high personal satisfaction, and a guarantee that our image and reputation—two critical assets for a researcher, which take a long time to be built and a very short one to be destroyed—have not been damaged.

For the same reason, Roberto has always rejected the idea of writing papers without a strong and new message to deliver. More than once, we have run the risk that our innovative ideas, published in just one paper, might not achieve a large audience; this risk has always been compensated by the constant creativity in our scientific production.

These research methods are now transmitted to the younger generation, and both Roberto and I are happy to see that young scholars still exist that can appreciate them, understanding their intrinsic value.

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[1]I still remember Roberto's words when I was at the beginning of my career: "if you want to criticise the neoclassical approach, you have to know it very well, and understand it for its great value". With the maturity I have now, I can say that I shall never thank Roberto enough for this advice.

   Last, but not least, the success of our long scientific life lies in the human and trustworthy relationship built between us. Just by his tone of voice in saying "pronto" when he replies to phone calls, I can easily tell whether Roberto is happy, worried, relaxed, ill, busy, in a hurry or angry. I know that when he gives an appointment, he will certainly be late and I can never rely on his punctuality. However, when important, complex and strategic issues have to be addressed and solved, I can be absolutely sure that he is (and will always be) available, on time, with a strategic answer and good advice. He has always been (and will always be) the best personal advisor I can imagine: calm, relaxed, self-confident, never imposing but rather suggesting solutions, leaving the autonomy for the final decision, exactly as a true and wise friend should behave. I shall never thank fate enough for making me choose as supervisor for my first degree dissertation an inspiring mind and a trustworthy human being like Roberto, with whom I could develop such a long, fascinating, happy and enriching journey in search of the unknown. I am sure that we have not yet arrived at the end of that journey. Our scientific relationship is too strong to end only because of an administrative change of position; especially, a vivid mind like Roberto's cannot retire all of a sudden. For these reasons, I am sure that many more years of fruitful cooperation will come, and I look forward to them.

When Periphery Becomes Core: The Long Stay in Padua of Roberto Camagni

22

Francesca Gambarotto

Padua. It was the first half of the 1980s when Roberto arrived. At the Faculty of Political Sciences you breathed a thick air produced by the local political climate. Roberto used to tell us that at that time Padua was a place very unwilling to dialogue and to design international research activity.

I attended his course of regional economics few years after his arrival. He brought a new spirit in our students' life suggesting new intellectual challenges about the meaning of economic space, why production is spatially concentrated, why regions differ in their economic growth pathways. In that time, Roberto realized cycles of lectures with some international professors who made research at the frontier of regional studies: Philippe Aydalot (University of Paris I), founder of GREMI (Groupe de Recherche Européen sur les Milieux Innovateurs), Chris Freeman, Nick Von Tunzelmann and Keith Pavitt (SPRU, University of Sussex), who investigated the role of innovation on the economic dynamics, Alexis Jacquemain (University of Louvain-la-Neuve), expert of the institutional role in the industrial competition, Peter Nijkamp (Vrije Universiteit, Amsterdam) who studied regional and environmental economics. At that time, all these professors were recognized as particularly innovative for their theoretical analyses.

For us, young students, facing these professors meant to face a new larger world of knowledge. We perceived, for the first time, the university as the centre of the world. We had the opportunity to have a dialogue with well-known researchers not only during the lessons but also in the real life. We could meet them in Camagni's office or over a coffee to feed our passion on urban and regional studies. Many among us started to open their mind on the complexity of territorial problems caused by market economies. Roberto was particularly able to involve us in new research projects. This attitude was a novelty for us because we were not used to participate actively in field projects and neither to a more informal academic

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relationship. In that period, he travelled a lot, especially to France, where he contributed to the development of the *milieu innovateur* theory. We enthusiastically accepted his coming and going, always herald of new ideas, while his colleagues reacted warmly or even openly in contrast. With this new academic routine, Roberto opened a new season in which two different research methods compared: the research of the local community, defined by those academic *élites* that renovate themself selecting people and research topics within the local groups and the second one, open to the international networks that produce innovative ideas through the interaction of different approaches, experiences and methodologies. It was too early for the Faculty to accept the challenge suggested by Roberto—strongly supported by Eugenio Benedetti—and to modernize the local academic reproduction. I remember very difficult times during which Roberto tried, with strong conviction, to bring brilliant economists in Padua. He truly believed to be able to transform a local laboratory in regional science into a national reference.

Roberto, "the Milanese" learnt to love Padua, "the periphery", and tried to build a new research excellence for the university. However, he left Padua before this research area grew. Few years later, the seed he placed found a fertile environment at the new department of economics. This was possible thanks to his professional and human vitalism during his stay at the university of Padua. The research community on territorial analysis in Padua would like to give him special thanks for his fundamental contribution.

From student to young researcher, it was a short step. The first research projects to which I collaborated with Roberto, gave me the opportunity to meet the Venetian entrepreneurs in their workplaces. For the first time, I could observe, and thus understand, the production system of my region. Roberto was a good teacher. Thanks to his teaching, I understood the relevance to get in touch with the real economy, its actors, how they act and relate locally and globally. To understand the development of a place, it is necessary not to stop in front of evidence but to look for the features and specific elements. Roberto was never satisfied with the available theoretical tools. He dismantled and reassembled concepts with a flexible and productive thought. This professional legacy has been a gift that I have used to gain the freedom of thinking and the trust in the scientific dialogue. Quoting Oscar Wilde "the real things in life are not taught nor learnt, but meet". Good Bye, Maestro!

Leading by Example Both in Research and in Application

Tomaso Pompili

I first met Roberto in early September 1984 in the corridors of the Economics Institute at Università Bocconi, Milan, just after returning from my postgraduate studies in the UK and presenting my first paper at the Milan ERSA Congress.

I had not been a student of his, but Riccardo Cappellin, then my mentor, introduced me to Roberto, who was managing several research projects and needed research assistants. Roberto and Riccardo, both associate professors, had been engaged in a fruitful scientific and applied cooperation for several years (Camagni and Cappellin 1981), but by then they were starting to pursue independent research projects and in 1984 Riccardo had enough research assistants.

I cooperated with Roberto very closely during the following eight years or so. From the start, Roberto made three guiding *academic principles* clear to me, as he did to other junior researchers.

First, he trusted us with a high degree of autonomy in conducting our work. He would hold an initial discussion, often a brainstorming one, on what we were aiming at and then he would apply a careful refereeing on the written output of what we had achieved and wanted to present publicly. Of course he was available for any intermediate discussion at our request, but, unlike other colleagues, he would not impose himself by the strength of his authority.

Second, he was ready to make the research funds he managed generously available to us, especially to finance our participation in national and international congresses. However, he stressed this was contingent on us being able to present a written paper at those congresses. We were researchers now, not students any longer, and we were expected to contribute, not just to listen and learn. Were our paper well received, he would help us in finding a publication outlet.

Third, he was adamant that any funded activity must provide scientifically relevant results. The Bocconi ethos viewed independent scientific research and

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commissioned applied research with equal consideration. Unlike other colleagues, Roberto insisted the two were not separated and that we were not in the latter "just for the money", but to transfer new ideas and even to get stimulation towards new ones.

These guidelines were very influential in shaping my working habits well beyond those eight years of close cooperation.

Not before long, I was struck by the variety of projects, a witness of Roberto's *intellectual curiosity and enthusiasm*, and perhaps a legacy of Innocenzo Gasparini, the rector of Università Bocconi and mentor of Roberto's generation of economists.

At the time Roberto was working simultaneously on regional, urban, and innovation economics. Italy's National Research Council was funding a nationwide Progetto Finalizzato (Purposeful Project) on Transport, and a grant was devoted to inland waterways, which Roberto designed and our group (including Diego Piacentini, later at Apple and Amazon) developed focusing on the relationship of goods transport and inter-modal terminal location with regional economic development of the non-metropolitan Po Valley provinces.

At the same time, Region Lombardy, the Province of Milan and Milan's Chamber of Commerce were funding Project Milan, following the path-breaking example of the New York research project: under Roberto's leadership our group broadened the scope to the Europe-wide role of the metropolitan area of Milan, applying both classical and not-so-classical concepts in urban economics. Later, the Italian government commissioned a project on metropolitan areas (Camagni and Predetti 1988; Camagni and Pompili 1991). These experiences contributed to Roberto's idea of writing his well-known handbook on urban economics.

Finally, in those years, IBM was financing research on the impact of computing on firms: Roberto established a solid relationship devoted to exploring innovation in firms, especially related to ICTs.

Later on, these research threads continued through our participation into international scientific projects such as UrbInno (on Urban Innovation), RURE (on Urban and regional Europe), GREMI (on Milieux Innovateurs), and others[1], but also into international projects with a focus on policy, such as cooperation with France's DATAR or with the EC Directorate on Regional Policy.[2] I was privileged in being given the opportunity to work with Roberto in all of these, following his customary guidelines on our working relationship and receiving the benefits of entry into the international scientific community, which came with several publications.

After eight years, in 1992 I obtained a permanent position as assistant professor at the University of Pavia and Roberto, already a full professor at Padua, was also relinquishing his connection to Bocconi (he would move to Milan's Politecnico a few years later). Thus, our relationship evolved into something less close-knit and

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[1]On these themes, see Camagni and Pompili (1990a, c), Pompili (1992), Camagni and Pompili (1993), Camagni et al. (1986) and Diappi et al. (1990).

[2]On these themes, see Camagni and Pompili (1990b), Camagni (1992); Pompili (1994).

exclusive. Even more importantly, the legacy of those years remained lively and bore fruits.[3]

Furthermore, our cooperation developed through our joint membership in the bodies of the Italian Section of Regional Science Association International. Here I could appreciate his skills and vision in the *organization of a scientific community* made both of academics and of practitioners.

In fact, Roberto went on providing stimulating opportunities for cooperation, mostly in *local policy-related fields*, and especially in spatial economic development planning, an interest Roberto shares with Cristina Gibelli, his wife and colleague.[4] Thus for several years we worked with the provinces of Cremona, Milan and Trento: a rural area, a metropolitan area and a mountain area. Here Roberto's old autonomy principle expanded into encouraging me into interacting directly and extensively with our clients. He also nudged me towards developing a practical and academic interest in policy evaluation.[5]

Finally, after I was called as professor at the University of Milan-Bicocca in 2002, our relationship has evolved into one of mutual respect and, dare I say, of friendly affection. Indeed, throughout all these years Roberto has insisted on *personal relationships* within the small research community he was leading, with not a few light-hearted dinners. In fact, there is one reproach I move to Roberto: his offer of oysters just arrived from France at one of those dinners, which caused all of us an awful night! I have not eaten oysters ever since.

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[3]Capello and Pompili (1994), Pompili (1996a, b) and Camagni et al. (2002a).

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[5]Camagni (2006), Chapter 20 in this book; Pompili (2009).

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Roberto Camagni, the *Milieu Innovateur* and Me

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Roberta Rabellotti

The second half of the 1980s saw the advent of the concept of *milieu innovateur*, thanks to a group of scholars known as the *Groupe de recherche européen sur les milieux innovateurs* (GREMI) with a particular interest in the active role of space in the innovation process (Aydalot 1986). Roberto Camagni was one of the leading scholars in GREMI.

At a time when most of the literature, particularly in Italy, was focused on industrial districts as the spatial concentration of small and medium firms specialized in traditional industries such as textile, clothing and footwear (Becattini 1979; Brusco 1982; Piore and Sabel 1984), Camagni and the GREMI group began a search for agglomerations of high tech firms around Europe. They were inspired by what was happening in Silicon Valley where there was already a strong concentration of semiconductor as well as computer firms, and Annalee Saxenian (1983) had just begun to investigate the circumstances that had encouraged the development of a high tech cluster around Palo Alto and San Jose.

Shortly after the award of my first university degree I met Roberto, who engaged me to interview high tech companies in the North Eastern periphery of Milan, searching in the fog (it was winter time!) for an Italian Silicon Valley. The findings of these interviews were published in our first joint paper (Camagni and Rabellotti 1986), and for me represented an incredible opportunity to learn and become passionate about doing research.

Going back to some of Camagni's main writings about the *milieu innovateur* is a journey of rediscovery of key topics, which only several years after the 1990s, came to the fore in the literature on clusters and industrial districts (see Chap. 4).

The idea of *milieu innovateur* as an operator aimed at reducing uncertainty in the innovation process, supporting firms in key functions such as searching, selecting and adapting information and dealing also with the complexity of innovation, is a

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milestone in Camagni's contribution to the cluster literature. A really novel aspect is the emphasis on *milieu* as an open system in which the existence of channels to access external knowledge is depicted as an essential condition for innovation, and for the evolution of clusters. When most of the literature on industrial districts concentrated on showing the existence of an internal *district effect* allowing firms in clusters to benefit from external economies, and spillovers consisting of local availability of knowledge, technology, skilled labor and specialized suppliers (Signorini 1994), Camagni (Chap. 4) pointed to the need to open up this *milieu*. He wrote that: "to an external strategy in order to avoid entropic death and a decline in its own innovative capability; firm networks seem the most important instruments (but hardly the only ones) to cope with the problem" (Chap. 4, p. 84).

In addition, the emphasis on firm networks was another brilliant contribution to the understanding of the evolution of clusters. The role played by inter-firm networking through joint ventures, strategic alliances, and more recently, involvement in global value chains (GVCs) is key in explaining the most recent dynamics occurring in clusters around the world. Clusters include external economies which are an unintentional by-product of agglomeration, while the effects of networking which is the result of explicit and voluntary cooperative behaviors are equally or even more crucial for cluster competiveness (Rabellotti 1997). This is one of the main findings from a study of Italian footwear clusters, which Roberto and I undertook in 1997—always within the framework of GREMI. We found that resilience to the increasingly globalized economic system was more common in those clusters that included some leading firms which invested in setting up external linkages to search for complementary resources such as marketing, branding, know how, and financial capital in short supply locally. At the same time, these leading firms maintained strong linkages with the local milieu, organizing domestic networks of subcontractors, buying a large proportion of their components locally, and taking advantage of a locally available skilled labor force. The importance of the balance between internal and external linkages in successful clusters is the focus of a formal model I subsequently developed with two colleagues (Morrison et al. 2013) to investigate the conditions under which external links can affect the dynamics of learning and innovation in clusters.

This contribution and many other articles I have published over the years following the first joint work in 1986 on the *milieu innovateur*, are vivid proof of how much I owe to Roberto for my intellectual enrichment. In those early years, I learnt so much in terms of creativity, enthusiasm, and passion for research to build on during the rest of my professional life.

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Part V

An Inspiring Mind:
The Second Generation of Scholars

Time Out

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25

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Andrea Caragliu

As I sit to gather memories of my relationship with Roberto (who to date never explicitly told me to simply address him as such-so I shall take the liberty to do so from now on) I listen to Dave Brubeck's "*Time out*" and enjoy digging into our 12 years relationship.

As many of us, I first met Roberto during the job interviews through which I was selected back in 2005. Right after that I had the chance to follow his class in Urban Economics, to us "youngsters" the typical gateway to research issues on this subject. I remember I found the course intriguing and I felt like a whole new landscape was wide opening up in front of me. I also found several of his references odd-Roberto never restrains from citing long (sometimes, centuries) dead scientists. It took me years to understand that indeed we stand on the shoulders of giants, and the likes of Ricardo, Marshall, Alonso, Von Thünen, and Marx would have a lot to say about modern cities.

During my first years at Politecnico I was involved by Roberto in some advising work for the Province of Trento, Italy. I recall very nice joint journeys (well, nice for the talks and work, perhaps less so for the trains they were made onto) to the periodic meetings we attended. After one of such meetings, Roberto and I helped a homeless fainting in front of the train station-a gesture that opened for a short while a view on Roberto's private side which I am clearly mostly missing.

One thing I am 100% sure of, though. Roberto loves consulting for policymakers. Initially I had heartfelt admiration for this feature; I was younger and craved for changing the world and I believed politics could lend a hand. I then became wary myself of the apparent failures of national and European policies; however, Roberto has over the years remained consistently interested, knowledge-able, and enthusiastic about his chances to "*counsel the Prince*" towards wise decision-making, and to my surprise he did manage to contribute positively to real policies. Among many worth of a mention, his contribution to the ESDP, the

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debate on supply-side policies, with the concept of Territorial Capital, and his lifetime commitment to a more just way of taxing urban land rent, and distributing private profits originating from new buildings to the whole society.

Since this book has already provided a lot of evidence about his scientific production, I would also like to discuss the way in which his work is still alive in today's and future research on urban economics. Roberto started his career when the Ph.D. title did not even exist in Italy; pressure for publishing was way less urgent; and the whole Italian academic community was more inward-looking and less urged to publish on international scientific journals. He anticipated all these trends brilliantly, thereby giving a major impulse to the development of the Italian Regional Science Association (AISRe).

No wonder, thus, that the juicy part of my recollections is related to when we worked together on research. Here I truly believe his work is already leaving a mark in current research on regional and urban topics. The Milieu Innovateur theory has first met vast consensus in Mediterranean countries, by nature more inclined to understand the intangible preconditions for local knowledge diffusion (in particular in the absence of sound formal institutions). However, much research is now being undertaken to measure these effects, a non-negligible role being played by the related variety literature which owes a lot (and this is duly acknowledged in the initial theoretical papers discussing this concept) to the Milieu. Roberto's role in developing, pampering, and nurturing the Milieu played a decisive role, along with supporters of the Industrial District, the French School of Proximity, and the Learning Region theories, in raising awareness about the importance of relational and cultural factors in driving a region's competitiveness.

A second major footprint left by Roberto is also related to his commitment to policy advising. His continuous search for the right policies for the right places has led him to challenge conventional wisdom and argue, if needed, with both top scholars (from time to time I still read his rebuttal of the concept of absolute competitive advantage in the *Urban Studies* paper also reproduced in this book) as well as with local, national, and European policymakers. It is not rare to see him storm our offices after a business meeting with a town councilor who did not yield the expected results; neither is it difficult to catch a glimpse of his appearances on local and national press, edited books, and pamphlets addressing where research tells us a reform or a new regulation may lead us. This point is particularly crucial, one of the roles researchers tend to forget way too often; in an era when publishing on top journals papers increasingly disconnected from reality is the only guiding light, Roberto's work keeps us constantly focused on delivering knowledge that is both new and usable for practical aims.

To add some spice to this second, research-related, part of my recollections, I guess a word or two should be spent on his sci-fi conception of time.

I mean this literally. Typically, Roberto would be non-responsive to any type of stimulus such as stressing that a deadline for a project is looming on the horizon; this until a few weeks or even days before the very deadline, when you either discover he did a lot of work but failed in passing this info, or else that he always assumed you would work with him full time (and again I mean this literally, 24/7,

vacations included) for meeting the deadline. The sci-fi component also becomes evident in terms of the amount of hours he can put in the very last stage of research. I guess the thrill of the last minute is what motivates him and makes him most creative; sure that's no job for the weak-at-heart.

I would like to conclude this chapter with an after thought. All this I am writing Roberto has done with his own flare. He likes good company, good food, good wine; he loves travelling and has sent us over the last few years beautiful pictures of glaciers, rare birds, remote islands, and the like. He is enthusiastic about his retreats on the Italian Apennines and Capri and often recalls trips he has made driving cars the passion for which we share (I cannot say the same about motorbikes-he is a fan of nakeds,[1] while my experience stops at a yellow moped I rode as a teenager). You can do this job in many ways; Roberto chose his own, and to the scientific legacy he has left to the Regional Science community we must also add the style he showed in his career.

And now we can make a step back, to the title of this chapter and to Dave Brubeck's 1959 masterpiece. I always wondered what makes this album particularly fascinating. Many listeners, remaining at the surface of this music, believe that it is just because it is easy to listen, especially with respect to other contemporary cool jazz works. Instead, I always found Brubeck's use of weird and original tempos (5/4 and 9/8 rather than the usual 3/4 and 4/4 we are used to) outstanding. You really have to listen hard to read between the lines; but when you do, you are left wondering how this was achieved.[2] Roberto's work is likewise; he likes to play scientific music that is original, and certainly does not suffer from publication bias; if he believes scientific commonsense does not work, then he says so and has no fear to contradict the mainstream.

A toast to Roberto and to many more joint papers and talks!

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[1]The first tribute to academic style proper in this chapter, the classical footnote that drives the reader's attention off the text, is dedicated to a explaining to those not into the two wheels world that naked motorbikes, or standard motorbikes, are "*versatile, general-purpose street motorcycles*" (Maher and Greisler 1998).

[2]In fact, evidence has been suggested that Brubeck's music does stimulate the brain in a way traditional jazz does not (Lamb 2012).

Roberto Camagni: A View from the Other Side of the Corridor

26

Ugo Fratesi

The ideas put forward by Roberto Camagni are numerous and notable. They speak for themselves in the whole book. In this short contribution, I prefer to narrate some facts and anecdotes on the way in which he works and on the way in which he allowed me to grow professionally in my 12 years of acquaintance with him.

I first met him a year and a half after the end of my PhD, at the moment in which, with him acting as chairman of the examination committee, I became an assistant professor in the same department. I had already had some excellent mentors, persons from whom I could learn useful and important elements not only on the discipline of economics but also on the profession of economist. In this activity, however, there is always a lot to learn from colleagues, including those younger than you, and especially there were and there still are lessons to learn from a scholar like Roberto Camagni.

When I first met him, I already knew his renowned public figure, and this reputation was instilling a non-negligible degree of reverence. At the time (2004) I was already in the field of regional economics, and in my mind he was the President of ERSA (whose conferences I had attended three times), one of the leading exponents of the Innovative Milieu theory (I appreciated the book he edited in 1991 "Innovation networks: spatial perspectives"), as well as the author of articles such as the beautiful one on regional competitiveness (Camagni 2002; Chap. 5) in which he quarreled with great arguments with the future Nobel laureate Paul Krugman, arguing that regional competitiveness is crucial because regions cannot enjoy comparative advantage, unlike nations, and are therefore at risk of desertification if they cannot be competitive.

In 12 years of acquaintance with him, I could appreciate up close many other aspects. He has always been an extremely busy ad committed person, involved in a

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large number of research projects and policy initiatives. But I have been able to exploit an advantage over the rest of the world, consisting not so much in having an office in the same corridor, but in sharing with him the same time zone, a couple of hours forward with respect to the one to which we belong. In this way, I could take advantage of those times later in the evening in which the offices and corridors are empty, for wide-ranging and profitable discussions, under relaxed conditions, making the most of his willingness to discuss, that has never been scarce.

Among the aspects that I could appreciate of Roberto Camagni, which I will develop below, his remarkable conceptualization skills, his ability to interact with different disciplines, while always remaining an authentic economist, and the capacity to relate with the world of policy makers.

On the first point, I would like to start from the fact that in all these years, the research team in regional and urban economics, which he founded years before my arrival, has been active in a large number of projects, in particular at the European level, including projects of the ESPON program, of the European Commission, and of the framework programs. I would like to remark that these projects never proved repetitive, not even when economies of scale could have been exploited, for his pride to work as a "craftsman", for which each piece is unique and specific, this because otherwise there is no "fun" (which would mean "passion") in doing the work.

In some of these projects (e.g. those projects related to the Territorial Impact Assessment; Chap. 20), Roberto Camagni held a more direct profile of conceptual and operational leader. In others, his role could not, for scarcity of time, be immediately operational. Nevertheless, he has always acted as a benchmark for the testing of ideas that were gradually developed and implemented. Indeed, the periodic checks of the work we were doing, have always been more than just a confront with a discussant, but have instead become regular opportunities to get directions on how to proceed. In particular, Roberto Camagni has always managed to provide guidance on how to conceptualize the various elements that came from our work or that of our partners, and to see two steps forward, i.e. not only foresight what would have resulted from our activities in the later stages, but already foreshadow what implications these results could have.

Basically, I have always been involved in regional economics. However, staying close to him, I could appreciate his ability—probably unique in Italy, if not internationally—to provide important contributions not only to regional economics but with the same success to urban economics, and to interact with different but neighboring disciplines such as evaluation, planning and policy analysis. A remarkable eclecticism that allowed him to be a point of reference for scholars of also of different disciplines. The most significant aspect is that he did not need to disguise each time into something different, but always fully remained an economist, and as such, for example, he was able to enter into dialogue with the planners without pretending to be one of them; at the same time, he was able to show them what economics as a science had to provide to planning problems, and to understand what hints planning as a discipline was able to give to economists in analyzing the city-level issues.

To what extent Roberto Camagni has been an economist can be perceived by reading his works, in which he makes extensive use of economic concepts such as rent, externality, efficiency, etc. to explain local processes. Particularly remarkable is his interest in the theories that have succeeded in different phases of thought, starting from the classics. I would like to mention here his interest for those normative studies in which the economy enters into a relationship with ethics.

In this regard, no profile of Roberto Camagni can forget his close relationship with policy issues and policy makers. No issue in his works is the goal in itself, and useful only to satisfy an intellectual curiosity; on the contrary, in everything he writes and maintains, there is always a clear attention to what is right and appropriate to improve the existing world, and to the positive actions that policy makers can implement.

In this way, he has always been able to be respected and recognized by policy makers, managing to combine the two characteristics of being extremely solid in the analysis and able to apply the analysis to concrete situations, in a discipline which is unfortunately mostly made by theoretically solid people with little interest to the concrete repercussions of their work, and by people attentive to reality, but less solid conceptually.

As a consequence, even for those almost daily in contact with him, it has always been interesting to listen to him in conferences and round tables, in which he manages not only to coordinate the speech but to systematize his thoughts and those of others to bring up a general coherent message.

As a last note, I want to mention his great intellectual curiosity. I already mentioned his interest in the various neighboring but different disciplines, but I would also like to remember his love for cultured debate with people who do not share his own views (e.g. Camagni 2008). His positions and his views on issues and people are not the result of prejudice; as a matter of fact, I have often heard from him utter words of appreciation for valid people with different ideas, and less flattering judgments about less solid people somehow closer to his views. This probably comes from his self-esteem, which allows him to bravely and honestly put forward his ideas and positions, without that fear that sometimes leads the weak ones to denigrate those who disagree with them.

Regarding the intellectual curiosity of Roberto Camagni an anecdote I like to cite regards the infinite number of times in recent years in which, after I had printed a recent academic or policy article in the floor's shared printer, I have seen it delivered to my room by him, with the request to print a copy also for him, along with a series of considerations and references to other literature that helped me to see the subject in a broader context.

Also for this reason, I believe to be among the many who think and hope that his retirement is only formal and not substantial, so he can continue to provide guidance to us and the discipline in the future.

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A Keen Traveller

27

Camilla Lenzi

I firstly met Roberto Camagni in his position of president of the evaluation committee of my public examination as Assistant Professor at Politecnico di Milano in December 2008. Prior to that, my knowledge of Roberto was linked to his scientific and intellectual merits, especially in the field of the spatial analysis of innovation processes.

Soon after my appointment at Politecnico di Milano, I started working with Roberto on his ideas about territorial impact assessment (Camagni 2006). At that time, he was principal investigator in a project called TIPTAP commissioned by ESPON, whose I became project manager, and involving a consortium with partners from Spain, the Netherlands and the UK. This project was followed up by a new one, called ARTS, commissioned as well by ESPON. In parallel, we also have been working on an important project on the territorial dimension of the knowledge and innovation economy in European regions, again commissioned by ESPON. The project, called KIT, coordinated by Roberta Capello as principal investigator and by myself as project manager, was an exceptional (and, admittedly, extremely fortunate) opportunity to make my background in innovation studies fit into and merged with the territorial approach of Roberto and Roberta, in the tradition of the milieu innovateur literature (Camagni 1991). This scientific and intellectual marriage has been particularly rich and fruitful and helped relaunch the interest and curiosity of Roberto towards the study on the spatial dimension of innovation and its policy consequences (Camagni and Capello 2013).

We travelled a lot all across Europe for the different meetings scheduled for these projects and the various ESPON seminars. The projects, in general, and our business trips, in particular, were a special occasion to work cheek by jowl with Roberto and to learn from his enormous and inspiring capital of both working experience and scientific knowledge.

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It is not by chance that travelling with Roberto was a so rich experience. He is indeed a keen and restless traveller, all around the world. Definitely, we do share the same enthusiasm for experimenting and exploring countries we never visited before. He inspired me two out of the most exciting trips I made, the desert in Namibia and the Okawango delta in Botswana, the geysers and the stars of Bolivia and San Pedro de Atacama in Chile. His passion for South America and Africa found fertile soil in my curiosity to travel far away and to cross ocean and continents, and my husband and I must thank him for his suggestions. We spend some times to exchange opinions and feelings about our trips and watch the pictures (as he is also a fond photographer!). I only regret not to be able to persuade him to visit India and the Lakshadweep, despite I lend him my guide. However, I am confident that he will never stop travelling and I can make it in the near future!

His passion for travelling is also reinforced by his curiosity and taste for food. Roberto his indeed a gourmand, with special passion for good wines and local products. He supported with enthusiasm and generosity my choice of linking my wedding list to the purchase of local products of farmers and shepherds of the L'Aquila province after the 2009 earthquake. On top of that, he also appreciated very much them once tasted, especially saffron, one of the most know excellences of the area!

His keenness for good local food is also practiced. In the last years, Roberto has become increasingly green-fingered and enthusiastic of the countryside and the techniques for feeding and growing crops. He listened with interest to my domestic experiments of growing salad, cherry tomatoes, green beans and the like on the terrace of my apartment! And he is also curious about my family tradition of picking olives, processing them and finally obtaining tasty and chilly olive oil, something that he did not experience yet.

In these years, we spent quite a lot of time talking about these amenable issues, and more importantly in scientific discussions. Roberto is indeed very entertaining and good at conversation, on a large range of subjects, beyond those I shortly mentioned here and representing our common interests. Besides a precious quality on the personal side, this was also important on the professional one. He delivered numerous and stimulating speeches in Italy and abroad, in scientific and policy oriented settings, and he is extremely fascinating with students that always appreciate his teaching style. I learnt a lot also in these occasions, in terms of communication and presentation skills, and of course in terms of scientific contents.

My legacy to Roberto is therefore multiple, scientifically and personally, and certainly long lasting.

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Three Lessons from and an Open Question to Roberto Camagni

28

Giovanni Perucca

When the project of writing a book collecting the most influential writings of Roberto Camagni was planned, and a section was allocated to the thoughts and memories of each of his collaborators, I immediately started thinking about my experience.

In the beginning, while reviewing the contributions you find in the present book, I was asking myself the following question: how did his ideas inspired my work? I was thinking to tell you something about this, but soon I realized that if you reached this part of the book you are already perfectly aware of his scientific production and the way in which it inspired other people, whose ideas, by the way, were maybe much better than mine. Definitely, such topic would be neither very original nor interesting. After some reflection, I started focusing on another question: did I learn anything from a daily cooperation with Roberto Camagni that I could not have learned from a deep study of his publications? Fortunately the answer to this question was affirmative, and a lot of things came to my mind.[1]

I joined the group of regional and urban economists at Politecnico di Milano quite recently, in February 2011. At that time, to be honest, I did not know a lot about this discipline, since my previous studies were mainly in public economics. You may object that, in the end, public economics is not forensic psychology, and the two fields are not so separate. I agree with you, but in a world where career-oriented incentives are constantly promoting the hyper specialization of scientists,

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[1] A brief note has to be made for the readers who do not personally know Roberto Camagni. I do not remember any case in which he had a "professoral" attitude with my colleagues or me. So, do not imagine a situation where he calls me in his office to state the golden rules of the perfect researcher, or something like that. Being extremely accessible and willing to discuss any professional issue with all his collaborators, I learnt from him by observing his way of working in different contexts, from research activities to the teaching to the participation to seminars, etc.

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the behaviour of Roberto Camagni at our first meeting surprised me. During the job interview he immediately understood that I had almost no background in regional economics (and actually I was not pretending), but despite of this he accepted me in the group, claiming that I could have filled the gap attending his courses. I do not know if he has ever regretted that decision, but this is the first lesson I learnt from him, a concept that was reinforced in the following years observing his attitude with colleagues from other disciplines: to have no prejudices towards those who did not follow your same path of studies and specialization.

My first months at Politecnico were then devoted, among other things, to the reading of books on regional economics and to the attendance of undergraduate courses. The audience of these classes was mainly of architects and urban planners and I had the chance to observe the teaching method of Roberto Camagni at work. Teaching economics to non-economists could be perceived as an easy task, since students do not have previous knowledge on the topic and, being their study programs focused on other subjects, they could be not so much interested. Well, I can assure you this is not the case. Students are generally interested in economics, or they would not enroll on the course. However, the lack of previous knowledge is matched with an instinctive aversion to economists, conceived as greedy and ultraconservative people. Overcoming this barrier is not easy at all, and this is the reason why I was very impressed by the level of appreciation and curiosity Roberto Camagni is able to reach with his students.[2] The same appreciation, I realized some years later, that colleagues from other fields of studies reserve to him for his capability to communicate and share his ideas. Therefore, the second lesson I learnt from him is that, whatever the audience you are addressing (students, scientists, policy makers) and whatever the tool you are using (a paper, a speech), the message has to be made comprehensible: if it is not, the fault is of the sender of the message, not of the receiver.

After this first period, step by step, I became more and more involved in the projects of the research group. In several cases they were directly supervised by Roberto Camagni, being based on his own original ideas, as for the line of research on territorial capital. Some other times his participation was less direct but always essential: I cannot remember all the situations, internal seminars or informal meetings, in which he generously gave us suggestions and advices to help us solving any kind of issue. The third lesson, however, does not refer to a single aspect of this profession. Rather, what I learnt is that the job of the researcher is a combination of multiple activities, from the preparation of a research proposal to the administration of its bureaucratic and financial aspects, from the participation in the life of the department to the teaching, from the organization of seminars to the editorial activities. Obviously the creation and dissemination of new ideas represent the core of this profession, the fraction appearing above the surface. But if this visible part is not rooted in a rich and solid combination of other skills and

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[2]Being failure rates at the exam well above the average of the other courses included in the same study program, I exclude this success to be due to the high grades obtained by the students.

competencies, the possibility to conduct free and independent research will be constrained by other people's choices and decisions. In these years I received guidance to test myself in all these activities. He taught me a job, and this is the most precious lesson I learnt from him.

I recognize to Roberto Camagni a further merit, whose value is comparable, in my opinion, to the one of the ideas presented in the first part of the present book. In his career he was capable to build a group of researchers passionate of their work, supporting each other when problems arise, sharing among them ideas and encouragements. I did not encounter very frequently such kind of working environments, and I am happy to be part of it. How did he do it? I do not know, but I am sure it was not just a matter of good luck. I am going to ask him when this book comes out, and I hope this will be the fourth lesson I will learn from him.

Part VI

An Inspiring Mind:
The Third Generation of Scholars

An Inspiring Cross-Fertilized Curiosity

29

Silvia Cerisola

It is now almost 3 years since the very first time I met Professor Camagni in his office, at Politecnico di Milano. It was an early March afternoon, and by then I could not have any idea of what would follow.

I could not know, for instance, that after some months he would have introduced me to a research topic that was still largely unknown to me and that would soon capture my thoughts: the impact of creativity on local economic development.

However, the truth is that he has also significantly contributed to my own research on creativity, not only through invaluable conversations and suggestions, but especially through his illuminating interpretation of Andersson et al. (1993) "mental cross-fertilization". I was just trying to figure out how to manage the different types of creative talents I was working on and I was struggling to devise the mechanism through which creativity could possibly affect territorial performances, when I came across a 2011 work by Professor Camagni. In that work he referred to 'mental cross-fertilization between different disciplines' explaining how such a process is realized through synergy, co-operation, and social interaction. He attached paramount importance to cognitive processes, associative thinking, diversity and interdisciplinarity, openness and relationality, complexity. All these elements are crucial in enhancing creativity and this vision was for me the conceptual starting point to investigate the mechanism linking creativity and local economic performance, according to the perspective that it is just the process of mental cross-fertilization, rather than creativity on its own, which is expected to drive local development. With astonishing clearness, Professor Camagni had provided me with the interpretative key I needed to develop my reasoning. This is, however, just one of the several occasions in which I have appreciated his multi-faceted intelligence, always capable of catching concepts and logical mechanisms immediately and with amazing accuracy.

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Another aspect that has always fascinated me is his culture and excellent command of both technical and general topics. And I could say the same about his vast knowledge, appreciation, and recognition of humanities—although this never implied losing his rigorous methodological and quantitative logic. These are probably the talents that pushed his extraordinary capacity of making himself understood and valued by students and colleagues, and also by scholars working in fields different (and sometimes very far) from economics.

Nevertheless, what has really been striking me day after day since that March afternoon of 3 years ago is his *curiosity*. Such an inexhaustible interest in new topics and fields. So natural and insatiable in his case, curiosity is indeed a wonderful gift, dramatically important in the research field. And with Professor Camagni this can be appreciated even in trivial everyday conversations. I confess that I love how this trait of his personality comes out through his willingness to share fascinating travel tales and lessons he keeps on learning all over the world.

I understand curiosity can hardly be learnt, therefore I would not dare to say that curiosity is the most important lesson I have retained from Professor Camagni. However, that has been for sure the greatest element of inspiration I took from him.

Thus, this is just how I see him every day: continuously hungry of new goals, discoveries, experiences. A wonderful *cross-fertilized curiosity* that will never be satiated.

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A Master in Teaching and Motivating His Students

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Alessandro Toppeta

I am new to the group, coming from an MSc in economics at University College London. However, the group, led by Professor Roberto Camagni and Professor Roberta Capello, made me feel part of it from the beginning, providing effective tutorship in my research effort. For example, Professor Camagni explained to me how the advanced statistics skills that I have learnt could be successfully applied to actual and relevant problems that he is tackling, such as urban development, economic crisis in Europe, cross-countries interdependence and influences. Professor Camagni is also contributing to the MASST (Macroeconomic, Sectoral, Social and Territorial), a forecasting territorial model of regional growth, with fundamental insights.

At Politecnico di Milano, I am fortunate enough to have the opportunity to meet Professor Roberto Camagni several times to get further advices and attend his lectures in urban and regional economics, noticing how he interacts with students and grabs their attention. His classes cover a wide range of topics from rent theory à la Von Thünen/Alonso, to urban hierarchy à la Christaller and Lösch.

Professor Camagni conveys difficult insights clearly, making many students passionate about the subject that he is teaching. In particular, Professor Camagni could trigger students' interest in urban and regional economics even if students do not study economics and have a technical background in Civil Engineering and Architecture. Professor Camagni did not bring to class just the theory, he rather explained the economic concepts, bridging them to his own experience in institutional roles and a long-term passionate research. Professor Camagni is interested in showing why these concepts are useful and how every student can apply what they are learning in their own future. In a typical lecture, he starts from an economic concept, like the Christaller model, explaining what the Christaller model is and motivating why it is useful in practice both for students that might aspire to develop

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urban development planning and economists that wish to contribute to the definition of an effective taxation system. He proves that different skills, including the capability to build and test rigorous economic models, are needed to achieve an effective governance of the local policies and understand the characteristics and the transformation of the overall urban and territorial system.

Professor Camagni is very open to discussions, bringing always new path-breaking insights, in order to push his students to think "out of the box". In class, Professor Camagni stated that he decided to become a professor because this profession allows him to be with smart people and continue constantly to learn as much as he has taught to many generations of students and researchers. His research and teaching have been inspiring to many cohorts of students and I hope that he will continue to advise us and provide his huge experience to solve new problems.

Annex A: Roberto P. Camagni—Curriculum Vitae

Born in Milano, Italy, 21 December 1946.

Full Professor of Urban Economics and of Assessment of urban transformations, Politecnico di Milano, since 1994.

Graduated in Economics at Bocconi University, Milan, 110/110, 1971. Special Student at the University of Pennsylvania, Philadelphia, 1976–1977.

Scientific Positions

President of the European Regional Science Association, 2003–2005.

President of the GREMI, an international association for the study of innovative environments or "milieux", located in Paris, Sorbonne University, since 1987.

President of AISRE, the Italian Section of the Regional Science Association, 1989–1992, Councillor 1992–1995, 2001–2006, 2010–2013.

Member of the Scientific Committees of:

– the Development Plan of the Trento Province (chairman), 1999–2003 and 2004–2008;

– the French Plan Urbain, of the Commissariat Général au Plan (1987–1994),

– DATAR, the French Agency for public intervention on the territory (1987–1994 and 1999–2003),

– the Regional Government of Lombardy (1986–1990);

– Chairman of the Economic and Territorial Observatory of the Milan Metropolitan Area (1986–1994).

Member of the Council of the ASRDLF, the French Regional Science Association, 1993–1998.

Regular adivisor to the EU, OECD, DATAR, Plan Urbain, the Italian Ministers of Public Works and Industry and many Italian and European Regional Governments in the fields of innovation diffusion and regional and urban development planning.

Coordinator of the Groupe de Prospective sur les Villes, Datar, Paris, 1994–1998.

Expert of the Italian Prime Minister for the ESDP – European Spatial Development Perspective (1995–1996); in charge of the Report on Urban Development and

Policies at the European Level, presented at the EU Minister Meeting in Venice, May 1996, within the Semester of Italian Chairmanship of the EU.

Expert of DG 16 of E.U. for the preparation of the *Framework for action for urban sustainable development,* 1998.

Member of the Committee for the Reform of the Urban Planning Law, Ministry of Public Works, Rome, 1997–1999.

Expert of the Minister for the Coordination of European Policies, Rome, for the ESDP and Structural Policies, 2000–2001; expert for the ESPON project of the Ministry of Infrastructures, 2001–2004.

Author of a textbook of urban economics: *Economia urbana: principi e modelli teorici,* Roma, La Nuova Italia Scientifica, 1992; French translation: Economica, Paris, 1996; Spanish translation: Antoni Bosch, Barcelona, 2005.

Prizes

Fellow of the Regional Science Association International – RSAI, 2017.

Prize of the Fondazione Confalonieri, Milan, for his studies in urban sustainable development (ex aequo with prof. Pignatti of Accademia dei Lincei), 2008.

Prize of the European Regional Science Association/European Investment Bank, 2010.

Distinciòn Académica from the Universidad Viña del Mar (Chile) for his studies in urban economics, 2011.

Prize Casentino for Economia (Poppi, Arezzo) for his studies in territorial economics, 2012.

Past Positions

Head of the Department for Urban Affairs at the Presidency of the Council of Ministers, Rome, under the Prodi Government, 1997–1998.

Vice president of the Group on Urban Affairs of the Territorial Development Service of OECD, Paris, 1998.

Full professor of Economic Policy and of Regional Economics at the University of Padua, Economics Department, 1987–1994. Professor of Economics, Bocconi University, Milan, 1978–1992. Professor of Economics of Industrial Automation, Bocconi University, Milan, 1992–1996.

Visiting professor for the following courses:

– Technology and Space, Sorbonne University, Paris 1, 1985.
– European integration and regional development, University of California Santa Cruz, spring 1995.
– Regional development and industrial structure, Université de Toulouse, spring 1996.
– Curso Magistral on Global cities, city-networks and urban milieux, Universitat Menendez Pelayo, Barcelona, 1999 and 2002.

Main Research Works for the EU

Director of the project "Quantification of the effects of legal and administrative border obstacles in land border regions", expert contract with DG Regio, Brussels, 2016–2017.

Co-director of the project "Economic growth and innovation in EUSALP: local specificities and growth assets for the competitiveness of EUSALP" (with R. Capello), Expert contract with DGRegio, Brussels, 2016–2017.

Partner of the project "Scenarios EU 2050", led by MCRIT, Barcelona, for ESPON, 2011–2013.

Lead partner at Politecnico di Milano (with Roberta Capello) of the project "KIT – Knowledge-Innovation-Territory" for ESPON 2013 Programme, Luxembourg, 2010.

Partner at Politecnico di Milano of the project "ARTS-Assessment of Regional and Territorial Sensitivity to EU Policies" for ESPON 2013 Programme, Luxembourg, 2010.

Lead Partner, at Politecnico di Milano, of the project "SPAN-3 – Spatial Perspectives at NUTS-3 level" for the ESPON 2013 Programme, Luxembourg, 2009.

Lead partner at Politecnico di Milano (with Roberta Capello) of the project on "Regions benefitting from globalisation and increased trade liberalisation", for DG Regio, 2008–2009.

Lead Partner, at Politecnico di Milano, of the project "Territorial Impact Assessment of Transport and Agricultural Policies – TIPTAP", for ESPON and DGRegio, 2008–2009.

Member of the ESPON 3.4.2. group for Territorial Impact of EU Economic Policies, led by IGEAT Bruxelles, 2005–2006.

Member of the ESPON 3.2. group for Scenarios of Regional Development in EU-29, led by IGEAT Bruxelles, in charge of the construction of a Macroeconomic-Territorial Econometric Model – MASST, 2004–2006; in charge of the construction of a Territorial Impact Assessment model – TIA for EU policies, (TEQUILA SIP model), 2005–2006.

Member of the group for the Assessment of the URBAN Initiative I and II for DG 16, 2002, and of the Urban Audit II, 2008–2009.

Member of the COST 9 group on Urban Quality, 1999–2000.

Member of the group SCARE, "Sustainable cities and renewable energies", with P. Nijkamp and A. Cocossis, 1995–1997.

Member of the research group SAFE-MED on renewable energy strategies in the Mediterranean countries, responsible of the evaluation team, 1995.

Director of the research "Development prospects of the Community's lagging regions and the socio-economic consequences of the completion of the internal market", realized by GREMI, 1990–1992, for DG 16; published in 1995 in Regional Development Studies, n. 24, EC, Brussels.

Member of the project "Research and technological development in the less favoured regions of the Community – STRIDE", directed by CURDS, Newcastle, 1985–1986; published on Documents, Office of Official Publications of the EC, 1987.

Co-director of the research "Sectoral productivity and regional policy", 1983–1984, for DG 16, within the Second Periodic Report on European Regions, 1980–1981; published on Documents, Office of Official Publications of the EC, 1985.

Co-director of the research "Regional disparities and European economic integration", for DG 16, within the First Periodic Report on European Regions, 1980–1981.

Annex B: Roberto Camagni's Publications by Scientific Themes

B.1 On the Definition and Measurement of Regional Competitiveness

Sectoral productivity and regional policy (with Cappellin R.), Document, Commissione delle Comunità Europee, Bruxelles, 1985

"Italian success stories of local development: theoretical conditions and practical experiences" (with Capello R.), in Stöhr W. (ed.), *Global challenge and local response,* The United Nations University, London, Mansell, 1990, 328–353

"Regional deindustrialization and revitalization processes in Italy", in Rodwin L., Sazanami H. (eds.), *Industrial changes and regional economic transformation*, London, Unwin and Hyman, 1991, 137–167

"Successo e crisi delle economie locali: un approccio diacronico interregionale" (with Capello R.), in Bielli M., Reggiani A. (eds.), *Sistemi spaziali: approcci e metodologie* , Milano, Franco Angeli, 1991, 221–243

"Disparités interrégionales dans la Communauté Européenne: structure et performpance des régions d'Objective 1 dans les années 80", in *Suds et Iles Méditerranéennes: terres d'initiative ou terres d'assistance?,* Atti del Simposio internazionale di Ajaccio, ottobre 1992; Editions Universitaires de Corse, 1994

"On the concept of territorial competitiveness: sound or misleading?", *Urban Studies*, Vol. 39, n. 13, 2395–2412, 2002

"A proposito di competitività territoriale: concetto solido o fuorviante?", in Cucculelli M., Mazzoni R. (eds.), *Risorse e competitività*, Franco Angeli, Milano, 2002, 125–139

"I problemi aperti nell'economia territoriale", *Scienze Regionali*, Vol. 2, n. 2, 2003, 103–110

"Considerazioni di prospettiva sull'economia regionale attraverso la lettura di un libro di testo", *Scienze Regionali*, Vol. 3, n. 1, 2004, 143–148

B.2 On the Sources of Regional Competitiveness

B.2.1 Source of Competitiveness and Lagging Regions

"Teoria economica spaziale e cicli di sviluppo regionale in Italia", in V. Balloni (ed.), *Processi di aggiustamento delle industrie negli anni '80*, Il Mulino, Bologna, 1990

Mezzogiorno e Scienze regionali: l' analisi e la programmazione (eds. Camagni R., Hoffmann A., Latella F.), Franco Angeli, Milano, 1992

"Scienze regionali e Mezzogiorno: concetti, principi e riflessioni normative", in Camagni R., Hoffmann A., Latella F. (eds.), *Mezzogiorno e Scienze regionali: l' analisi e la programmazione*, Franco Angeli, Milano, 1992, 23–45

"Competere in prospettiva europea: la Padania nel quadro delle grandi regioni economiche d'Europa", in *La Padania, una regione italiana in Europa,* Edizioni della Fondazione Giovanni Agnelli, Torino, 1992, 285–300

"Le politiche per il Mezzogiorno a una svolta decisiva", *Delta,* n. 54–57, 1993

Cohesion and the development challenge facing the lagging regions, Regional development studies, n. 24, European Commission, Bruxelles, 1995

Strategie di competitività territoriale: il paradigma a rete, (eds. Camagni R., Capello R.), Edizioni Seat, Milano, 1997

"Risques et chances de l'intégration monétaire des territoires", in A.A.V.V., *Euro: chances et dèfis pour les territoires*, Editions de l'Aube, Paris, 1998, 65–74

La teoria dello sviluppo regionale, CUSL Nuova Vita, Padova, 1999

L'Italia nello spazio europeo, Presidenza del Consiglio dei Ministri, Gangemi editore, Roma, 2001

"Struttura e grandi tendenze del territorio europeo", (with Lugeri N., Musolino D.), in Camagni R. (ed.), *L'Italia nello spazio europeo*, Presidenza del Consiglio dei Ministri, Gangemi editore, Roma, 2001, 17–50

Scritti in memoria di Eugenio Benedetti (eds. Camagni R., Fiorentini R., Mistri M.), Cedam, Padova, 2002

Competitività del sistema produttivo (eds. Camagni R., Zaninotto E.), Quaderni della Programmazione n. 1, Edizioni 31, Provincia Autonoma di Trento, 2002

B.2.2 Territorial Competititveness and Globalization

"Razones, principios y cuestiones para la polìtica de desarrollo espacial en una era de globalizaciòn, localizaciòn y trabajo en red", in J. Subirats (ed.), *Redes, territorios y gobierno*, Diputaciò de Barcelona, Barcelona, 321–350, 2002

Benchmarking territoriale, Quaderni della Programmazione n. 3, Edizioni 31, Provincia Autonoma di Trento, 2002

Atlante Tematico ESPON, Ministero delle Infrastrutture e dei Trasporti, Istituto Geografico de Agostini, 2005

"ICTs and Territorial Competitiveness in the Era of Internet" (with Capello R.), *The Annals of Regional Science*, Vol. 39, n. 3, 2005, 421–438

"Attractivité et compétitivité: un binôme à repenser", *Territoires 2030*, n. 1, 2005, 11–16

"Acerca de la solidez del concepto de competitividad territorial", in Camagni R., A. Tarroja (eds.), *Una nueva cultura del territorio* (eds.), CUIMP, Diputaciò de Barcelona, Barcelona, 2006, 111–136

"Compétitivité territoriale: la recherche d'avantages absolus", *Reflets et Perspectives de la Vie économique*, n. 1, 2006, 95–115

B.2.3 Spatial Scenarios and Quantitative Foresights

Modelling regional scenarios for the enlarged Europe (eds. Camagni R., Capello R., Chizzolini B., Fratesi U.), Springer, Berlin, 2008

"From forecast to quantitative foresight: territorial scenarios for an enlarged Europe" (with Capello R.), in Capello R., Camagni R., Fratesi U., Chizzolini B., *Modelling regional scenarios for the enlarged Europe*, Springer Verlag, Berlin, 2008, 1–10

"Towards a conclusion: regional and territorial policy recommendations", in Capello R., Camagni R., Fratesi U., Chizzolini B., *Modelling regional scenarios for the enlarged Europe*, Springer Verlag, Berlin, 2008, 283–306

"After crisis scenarios for the European regions", *Chiikigaku Kenkyu*, 2012, 3–24

"Quantitative foresight at sub-regional level: the model and estimation results" (with Affuso A., Capello R.), in Camagni R., Capello R. (eds.), *Spatial Scenarios in a Global Perspective: Europe and the Latin Arc Countries*, Edward Elgar, Cheltenham, 2011, 91–110

"Scénarii qualitatifs: quelques éléments méthodologiques" (with Capello R.), in Bourdeau-Lepage L., *Regards sur la ville*, Economica, Paris, 2012, 184–208

Spatial Scenarios in a Global Perspective: Europe and the Latin Arc Countries (eds. Camagni R., Capello R.), Edward Elgar, Cheltenham, 2011

Escenaris territorials per a les regions europees: el cas de Barcelona (with Trullen J.), *Papers* n. 54, Régio Metropolitana de Barcelona, 2011, 8–10 (also in Castillano)

"Integrated scenarios for European Regions" (with Capello R., Robert J.), in Camagni R., Capello R. (eds.), *Spatial Scenarios in a Global Perspective: Europe and the Latin Arc Countries*, Edward Elgar, Cheltenham, 2011, 27–40

B.2.4 Territorial Capital

"Regional competitiveness: towards a concept of territorial capital", in Capello R., Camagni R., Fratesi U., Chizzolini B. (eds.), *Modelling regional scenarios for the enlarged Europe*, Springer Verlag, Berlin, 2008, 33–48

"Per un concetto di capitale territoriale", in Borri D., Ferlaino F. (eds.), *Crescita e sviluppo regionale: strumenti, sistemi, azioni*, Milano, Franco Angeli, 2009, 66–90

"Competitività e capitale territoriale: dalla concettualizzazione a una analisi empirica" (with Capello R.), in Bramanti A., Salone C. (eds.), *Lo sviluppo territoriale nell'economia della conoscenza: teorie, attori, strategie*, Milano, Franco Angeli, 2009, 35–52

"Territorial capital and regional competitiveness: theory and evidence" (with Capello R.), *Studies in Regional Science*, Vol. 39, n. 1, 2009, 19–40

"Territorial capital and regional development", in Capello R., Nijkamp P. (eds.), *Handbook of regional growth and development theories*, Edward Elgar Pub., Cheltenham, 118–132, 2009

"Il capitale territoriale: una tassonomia", *Sviluppo e Organizzazione*, n. 232, 2009, 16–21

"Accumulazione e decumulazione di capitale territoriale: verso politiche appropriate", *Sviluppo e Organizzazione*, n. 233, 2009, 16–19

"Regional competitiveness and territorial capital: a conceptual approach and empirical evidence from the EU" (with Capello R.), *Regional Studies*, 2012, 1–20

B.3 On the Role of Territory in Innovation Processes

B.3.1 Innovation Adoption in Space

Cambiamento tecnologico e diffusione territoriale (eds. Camagni R., Cappellin R., Garofoli G.), Milano, Franco Angeli, 1984

"Spatial diffusion of pervasive process innovation", *Papers of the Regional Science Association*, Vol. 58, n. 8, 1985, 83–95

Innovazione e sviluppo nelle regioni mature (eds. Camagni R., Malfi L.), Milano, Franco Angeli, 1986

"The programmable automation trajectory in time and space" (with Arcangeli F.), in Cappellin R., Nijkamp P. (eds.), *The spatial context of technological development*, Avebury, Aldershot, 1990, 95–138

"Spatial implications of technological diffusion and economic restructuring in Europe: the Italian case", *Ekistics,* Special issue on the problems and science of human settlements, Vol. 58, 1991, 330–335

"Knowledge-based economy and knowledge creation: the role of space" (with Capello R.), in Fratesi U., Senn L. (eds.), *Growth and innovation of competitive regions*, Springer Verlag, Berlin, 2009, 145–166

B.3.2 The Milieu Innovateur Theory

"Technological change, uncertainty and innovation networks: towards a dynamic theory of economic space", in Boyce D., Nijkamp P. and Shefer D. (eds.), *Regional Science: Retrospect and Prospect*, Berlin, Springer-Verlag, 1991, 211–249

Innovation networks – spatial perspectives, London, Belhaven-Pinter, 1991

"Irreversible investment and internal evolution of firm networks: two case studies in the Lombardy Region" (with Pompili T.), in Maillat D., Quévit M. and Senn L. (eds.), *Réseaux d'innovation et milieux innovateurs,* IRER-GREMI, Neuchâtel, 1993, 235–258

"Space-time and the concept of milieu innovateur", in Blien U. et al. (eds.), *Regionalentwicklung und regionale Arbeitsmarktpolitik,* Beiträge zur Arbeitsmarkt und Berufsforschung, Nürnberg, 1994, 74–89

"Global network and local milieu: towards a theory of economic space", in Conti S., Malecki E. and Oinas P. (eds.), *The industrial enterprise and its environment: spatial perspectives,* Avebury, Aldershot, 1995, 195–216

"Espace et temps dans le concept de milieu innovateur", in Rallet A. and Torre A. (eds.), *Economie industrielle et économie spatiale,* Paris, Economica, 1995, 193–210

"Dal milieu locale alla creazione tecnologica", in Berra M. (eds.), *Ripensare la tecnologia: informatica, occupazione e sviluppo regionale,* Torino, Boringhieri, 1995, 73–85

"The concept of innovative milieu and its relevance for public policies in European lagging regions", *Papers in Regional Science,* Vol. 74, n. 4, 1995, 317–340

"Footwear production systems in Italy: a dynamic comparative analysis" (with Rabellotti R.), in Ratti R., Bramanti A., Gordon R., *The dynamics of innovative regions,* GREMI, Ashgate, Aldershot, 1997, 139–164

"Innovation and performance of SMEs in Italy: the relevance of spatial aspects" (with Capello R.) *Innovation, networks and localities*, Springer Berlin Heidelberg, 1999, 181–214

"*Milieux innovateurs* e processi di apprendimento collettivo" (with Capello R.), in Brioschi F. and Cainelli G. (eds.), *Diffusione e caratteristiche dei gruppi di piccole e medie imprese nelle aree distrettuali,* Fondazione Giordano dell'Amore, Giuffré, Milano, 2001, 275–286

"Milieux innovateurs and collective learning: from concepts to measurement" (with Capello R.), in Acs Z.J., de Groot H.L.F., Nijkamp P. (eds.), *The emergence of the knowledge economy*, Springer, Berlin, 2002, 15–46

"Compétitivité territoriale, milieux locaux et apprentissage collectif: une contre-réflexion critique", *Revue d'Economie Régionale et Urbaine*, n. 4, 2002, 553–578

"Competitività territoriale, milieux locali e apprendimento collettivo: una contro-riflessione critica", in Camagni R., Capello R. (eds.), *Apprendimento collettivo e competitività territoriale* Franco Angeli, Milano, 2002, 29–56

"Apprendimento collettivo, innovazione e contesto locale" (with Capello R.), in Camagni R., Capello R. (eds.), *Apprendimento collettivo e competitività territoriale* Franco Angeli, Milano, 2002, 11–26

"Territorial competitiveness, globalisation and local milieux", *European Spatial Research and Policy*, Vol. 9, n. 2, 63–90

Apprendimento collettivo e competitività territoriale (eds. Camagni R., Capello R.), Franco Angeli, Milano, 2002

"Natural resources, know-how and territorial innovation: the apple production system of Val di Non, Trentino", in Camagni R., Maillat D., Mattéaccioli A. (eds.), *Ressources naturelles et culturelles, milieux et développement local* EDES, Neuchatel, 2004, 235–260

Ressources naturelles et culturelles, milieux et développement local (eds. Camagni R., Maillat D., Mattéaccioli A.), EDES, Neuchatel, 2004

"Natural and cultural resources and the role of the local milieu: towards a theoretical interpretation", in Camagni R., Maillat D., Mattéaccioli A. (eds.), *Ressources naturelles et culturelles, milieux et développement local* EDES, Neuchatel, 2004, 291–298

Milieux innovateurs: théorie et politiques (eds. Camagni R., Maillat D.), Economica, Paris, 2006

"Changement technologique, milieu local et réseaux d'entreprises : pour une théorie dynamique de l'espace économique", in Camagni R., Maillat D. (eds.), *Milieux innovateurs: théorie et politiques*, Economica, Paris, 2006, 74–98

B.4 On the Five Principles in Urban Economics

"L'economia dell'organizzazione e dello sviluppo della città", in Bertuglia C.S., La Bella A. (eds.), *I sistemi urbani* , Milano, Franco Angeli, 1991, 95–143

Economia urbana: principi e modelli teorici, Roma, La Nuova Italia Scientifica, 1992

"Beyond complexity in urban development studies", in Bertuglia C., Bianchi G., Mela A. (eds.), *The city and its sciences,* Physica-Verlag, Heidelberg, 1998, 363–385

Principi di economia urbana e territoriale, Roma, La Nuova Italia Scientifica, 1993; 5° ristampa per l'Editore Carocci di Roma nel 2008

Principes et modèles de l'économie urbaine, Economica, Parigi, 1996

Economìa Urbana, Antoni Bosch, Barcelona, 2005

"La città nell'economia urbana: requisiti, risultati acquisiti e nuovi contenuti empirici", *Scienze regionali – Italian Journal of Regional Science*, Vol. 6, n. 3 (special issue on *L'interpretazione della città nell'economia urbana*), 2007, 67–82

"Agglomeration, hierarchy, urban rent and the city", in *Scienze Regionali – Italian Journal of Regional Science*, Special Issue on Thirty years of regional science in Italy – Retrospect and prospects, Vol. 8, n. 3, 2009, 127–150

B.5 On Optimal City Size and Agglomeration Economies

"Benefici e costi di localizzazione urbana: un'analisi delle determinanti" (with Capello R.), in Capello R., Hoffmann A. (eds.), *Sviluppo urbano e sviluppo rurale tra globalizzazione e sostenibilità,* Franco Angeli, Milano, 1998, 45–67

"Beyond optimal city size: an evaluation of alternative urban growth patterns" (with Capello R.), *Urban Studies*, Vol. 37, n. 9, 2000, 1479–1496

"One or infinite optimal city sizes? In search for an equilibrium size for cities" (with Capello R., Caragliu A.), *Annals in Regional Science*, 2013, 51: 309–341. Short version in: IRES – Royal Institute for Strategic Studies, *Acts of the International meeting 'New urban world future challenges: which development model for the Moroccan cities'*, Rabat, 2012, 169–173

"Equilibrium vs. optimal city size: evidence from Italian cities" (with Capello R., Caragliu A.), *International Journal of Global Environmental Issues*, Vol. 13, n. 2–4, 2014, 170–188

"Dinamiche strutturali delle città di primo e secondo rango in Europa: analoghe leggi, elevate specificità" (with Capello R., Caragliu A.), in Agnoletti C., Camagni R., Iommi S., Lattarulo P. (eds.), *Competitività urbana e policentrismo in Europa*, Il Mulino, Bologna, 2014, 29–62

"The rise of second-rank cities: what role for agglomeration economies?", *European Planning Studies*, Vol. 23, n. 6, 2015, 1–21

"Second Rank City Dynamics: Theoretical Interpretations Behind Their Growth Potentials" (with Capello R.), *European Planning Studies*, Vol. 23, n. 6, 2015, 1041–1053

"Static vs. Dynamic Agglomeration Economies: Spatial Context and Structural Evolution behind Urban Growth" (with Capello R. and Caragliu A.), *Papers in Regional Science*, Vol. 95, n 1, 2016, 133–158

B.6 On Urban Crisis and Urban Success

B.6.1 Urban Competitivenss and Globalization

La trasformazione economica della città (eds. Camagni R., Predetti A.), Irer-Progetto Milano, Franco Angeli, Milano, 1988

"Le aree metropolitane e gli effetti del 1992", *Territorio*, n. 5, 1990, 109–120

"Metropolitan areas and the effects of 1992", in Quévit M. (eds.), *Regional development trajectories and the attainment of the European Internal Market*, Gremi, Louvain-la-Neuve, 1991

"Le grandi città italiane e la competizione a scala europea", in Costa P., Toniolo M. (eds.), *Città metropolitane e sviluppo regionale*, Franco Angeli, Milano, 1992, 23–46

"Urban marketing as an instrument of competition between cities", in Ave G., Corsico F. (eds.), *Urban Marketing in Europe,* Torino, Edizioni Torino Incontra, 1994, 310–319

"Le sfide per l'Europa delle città: globalizzazione, coesione e sviluppo sostenibile", in Brunelli W. (ed.), *Margini regionali: le regioni che vogliamo,* Franco Angeli, Milano, 1998

"La ciutat a Europa: globalitzaciò, cohesiò i desenvolupament sostenible", *Revista econòmica de Catalunia,* 36, 1998, 30–50

"Globalizzazione e sviluppo delle economie locali: la sfida per le grandi aree urbane", *Sinergie,* volume dedicato a Il Marketing per lo sviluppo locale, n. 49, 1999, 11–20

"Ruolo economico e contraddizioni spaziali delle città globali: il contesto funzionale, cognitivo, evolutivo", in Gajo P. (ed.), *Il governo del territorio: complessità e cambiamento*, Ce.S.E.T., Firenze, 1999, 17–46

"The economic role and spatial contradictions of global city-regions: the functional, cognitive and evolutionary context", in Scott A.J. (ed.)*, Global city-regions: trends, theory, policy*, Oxford University Press, Oxford, 2001, 96–118

"Cities: a case in point", in Lehner F., Charles A., Bieri S., Paleocrassas Y. (eds.), *The wealth of people – An intelligent economy for the 21st century,* The Steilmann Report, Brainduct Edition, Bochum, 2001, 275–312

B.6.2 Urban Milieux

"PME innovatrices et métropole industrielle dynamique: la zone nord de Milan" (with Rabellotti R.), in Maillat D., Perrin J.-C. (eds.), *Entreprises innovatrices et développement territorial,* GREMI-IRES, Université de Neuchâtel, 1992, 41–53

"Nuove forme dello sviluppo urbano e nuova centralità metropolitana", in Dematteis G. (eds.), *Il fenomeno urbano in Italia: interpretazioni, prospettive, politiche,* Milano, Franco Angeli, 1992

Les milieux urbains : innovation, systèmes de production et ancrage (eds. Camagni R., Crevoisier O.), EDES, Neuchatel, 2000

"La ville comme Milieu : de l'application de l'approche GREMI à l'évolution urbaine", *Revue d'Economie Régionale et Urbaine*, n. 3, 1999, 591–606

"Das urbane Milieu: Voraussetzung fur Innovation und wirtschaftlichen Erfolg", in Matejovski D. (ed.), *Metropolen, Laboratorien der Moderne*, Campus Verlag, Frankfurt, 2000, 292–307

"Urban structural dynamics and Innovative Milieux: the communication and the fashion production systems in the metropolitan area of Milan", (with Galbiati M., Pompili T.), in Camagni R., Crevoisier O., *Les milieux urbains: innovation, systèmes de production et ancrage*, EDES, Neuchatel, 2000, 185–222

"Papel economico y contradicciones espaciales de las ciudades globales: el contexto funcional, cognitivo y evolutivo", in Becattini G., Costa M.T., Trullen J. (eds.), *Desarrollo local: teorìas y estrategias*, Civitas Ediciones, Madrid, 2002, 215–244

"La città come milieu e i milieux urbani: teoria e evidenza empirica" (with Capello R.), in Garofoli G. (ed.), *Impresa e Territorio*, Il Mulino, Bologna, 2003, 237–275

"Uncertainty, social capital and community governance: the city as a Milieu", in Capello R., Nijkamp P. (eds.), *Urban dynamics and growth: advances in urban economics,* Amsterdam, Elsevier, 2004, 121–152

"Urban milieux: from theory to empirical findings" (with Capello R.), in Boschma R.A., Kloosterman R.C. (eds.), *Learning from Clusters*, Springer Verlag, Berlin, 2005, 249–274

"Creativity, culture and urban milieux", in Fusco Girard L., Baycan T., Nijkamp P. (eds.), *Sustainable city and creativity*, Ashgate Pub. Ltd, Farnham, 2011, 183–198

B.6.3 Urban Rural Relationship

"Inter-regional and inter-urban economic power relations as command over local resources: the Italian case" (with Pompili T.), in Shachar A., Oberg S. (eds.), *The world economy and the spatial organization of power*, Aldershot, Avebury, 1990, 258–284

"Competence, power and waves of urban development: an Italian example" (with Pompili T.), in Nijkamp P. (ed.), *Sustainability of urban systems: a cross-national evolutionary analysis of urban innovations*, Aldershot, Gower, 1990, 37–86

Tra città e campagna: periurbanizzazione e politiche territoriali, (eds. Boscacci F., Camagni R.), Bologna, Il Mulino, 1994

"Rural and urban interfaces and interactions", in O'Cinnéide M. (ed.), *Territorial Cohesion,* Report of the Conference organised by the Directorate General for Regional Policy of the EC, Irish Presidency of the European Union, 2004, 119–121

B.7 On Urban Rent

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