

The background of the cover is a light yellow-green color with several faint, stylized leaf motifs scattered across it. Each motif consists of a stem with two leaves pointing upwards and to the right.

SPACE AND TRANSPORT IN THE WORLD-SYSTEM

Paul S. Ciccantell, Stephen G. Bunker

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Paul S. Ciccantell
Stephen G. Bunker

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Series Foreword

Immanuel Wallerstein

The Political Economy of the World-System (PEWS) Section of the American Sociological Association was created in the 1970s to bring together a small but growing number of social scientists concerned with analyzing the processes of world-systems in general, and our modern one in particular.

Although organizationally located within the American Sociological Association, the PEWS Section bases its work on the relative insignificance of the traditional disciplinary boundaries. For that reason it has held an annual spring conference, open to and drawing participation from persons who work under multiple disciplinary labels.

For PEWS members, not only is our work unidisciplinary, but the study of the world-system is not simply another “specialty” to be placed beside so many others. It is instead a different “perspective” with which to analyze all the traditional issues of the social sciences. Hence, the themes of successive PEWS conferences are quite varied and cover a wide gamut of topics. What they share is the sense that the isolation of political, economic, and sociocultural “variables” is a dubious enterprise, that all analysis must be simultaneously historical and systemic, and that the conceptual bases of work in the historical social sciences must be rethought.

1

Introduction: Space, Transport, and World-Systems Theory

Paul S. Ciccantell and Stephen G. Bunker

Key metaphors in world-system analysis are profoundly spatial, but there have been few systematic attempts to understand how space, location, and topography affect world-system organization and process. The raw materials needed for industrial production are located in specific places with particular topographies that directly affect the organization of their extraction and processing. Space and place constitute strategic advantages and obstacles in the coordination of commodity chains. National states plan and invest around problems of space in their domestic territories as well as in their location within the world economy.

The articulation and integration of core and periphery across space depend on transport. As world-systems incorporate more space and transform more raw materials into commodities, material flows across space and matter incorporated into particular built environments increase as well. This increase creates requirements and opportunities for technological, organizational, and institutional innovations that create economies of scale in railways, ports, loading and unloading equipment, and ships. These innovations increase the amounts of inflexibly sunk capital in vehicles and infrastructure, thereby, fomenting incentives and pressures for ever-tighter coordination of transport systems across regional and national boundaries. Because the costs and benefits of building integrated transport systems around the globe are unequally distributed, these systems

contribute directly to the creation and reproduction of inequalities and subordination in the world-system.

In this sense, transport and transport systems provide a critical medium for the structuring and periodic reorganization and expansion of the world-system. The construction and regulation of these complex systems provide a useful analytic window into the interactions of technological, organizational, and political changes that occur as rising economies attempt to restructure world markets for raw materials and finished goods to their own advantage.

Similarly, the construction of global air travel, air freight, and telecommunications networks also have had profound impacts on the flows of goods, capital, people, and information in the world economy. The pace of capital accumulation has increased dramatically, transnational corporations can coordinate far-flung subsidiaries and subcontractors, and global products are part of everyday life throughout the world. These networks have helped reshape and repropotion location, distance, and position in the world-system in a variety of ways, because capital and information flow instantaneously around the globe and highly valued commodities and skilled labor are moved thousands of miles in a matter of hours, rather than weeks or months.

We believe that closer attention to issues of space and location and to the ways that transport mediates the multiple relations between the local and the global can enrich world-systems theory and many other perspectives on the world economy, including international political economy and analysis of globalization. The list of unexamined and underexamined topics we developed in our call for papers for the 1996 Political Economy of the World-System annual meeting included:

- technical and organizational innovations in transport as a factor in hegemonic ascent and decline;
- differentiating aspects of space and the built environment in core and periphery;
- transport as a component in raw materials access strategies;
- transport, location, and information flows in the construction of commodity chains;
- transport as a leading economic sector;
- the interaction of transport and communication technologies in transforming space and location in the world economy; and
- transportation and communications as factors in human and capital flows in the world economy.

The papers from the resulting conference focused particularly on the first four questions. This introduction will link this body of work to a number of current issues in world-systems theory and in the general field of analyses of the capitalist world economy. Then, a brief synthetic presentation of a theoretical model that focuses on the centrality of transport and raw materials in shaping and restructuring the capitalist world economy will be made. Finally, an overview of each of the chapters in this volume will be provided. An afterword discussing the findings in this volume, the implications of these findings, and avenues for future research concludes the book.

SPACE, TRANSPORT, AND WORLD-SYSTEMS THEORY

The fundamental concepts of core, periphery, and semiperiphery are both analytical and spatial. World-systems processes and relationships between core, periphery, and semiperiphery are rooted in physical locations and the flows of raw materials, manufactured products, transport vehicles, information, capital, and labor among these physical locations. The spatiality of the world-system is also simultaneously the structure within which social actors, including states, firms, labor unions, and social movements (among others), must act and the structure that these social actors attempt to strategically restructure in ways that redound to their own benefit. Philip Steinberg's chapter in this volume, for example, addresses one clearly undertheorized spatial dimension of the capitalist world economy: the ways that different capitals and different states manipulate and redefine the ocean and its multiple roles, including those of a transport medium, a location of military conflict, a potential source of minerals, and a focus of debates over property rights.

A number of other chapters also address directly and indirectly this spatial dimension of the capitalist world economy by grounding their analyses in the simultaneous processes of spatial integration and differentiation that long have characterized this type of world-system. Wilma Dunaway's chapter examines the role of the Appalachian region as an extractive periphery for British and northern U.S. capital accumulation; Jonathan Leitner's chapter examines the process of creating an internal extractive periphery via the development of railroad links between the Upper Peninsula of Michigan and the emerging industrial centers of the United States. Richard Lee's chapter analyzes the construction of rail transport links from the interior of western Africa to exporting ports for shipment to European imperial powers as a result of intercore

competition. David Smith and Michael Timberlake examine a relatively new form of linkage across space closely tied to the hierarchical structure of the world-system: air travel networks.

TRANSPORT, GLOBALIZATION, AND WORLD-SYSTEMS THEORY

The much-discussed concept of globalization focuses attention on the increasing interconnections between nations, markets, and locations around the world (see, e.g., McMichael 1996; Sassen 1995; Scott 1995; Mittelman 1995; Brecher & Costello 1994). Communications technology innovations (e.g., global satellite transmission networks, fax machines, and the Internet) and institutional innovations (e.g., the implementation of World Trade Organization multilateral trading system and World Bank and International Monetary Fund financial support for “market-friendly” reforms around the world) are widely recognized in studies of globalization. Equally if not more important have been the innovations in transport technology such as the container revolution outlined in John Gulick’s chapter, organizational innovations such as the development of liner conferences to regulate the shipping of manufactured products discussed by Baldev Raj Nayar, and technological, organizational, and institutional innovations such as the creation of bulk raw materials supply systems linking raw materials peripheries around the world, first to Japan and later to western Europe and a number of nations in East Asia (Bunker & Ciccantell 1995).

At the same time that locations around the world are being more tightly integrated, locations are becoming increasingly spatially differentiated. Transport and communications innovations integrate but do not erase the differences between core, periphery, and semiperiphery. For example, container ports and airports offer more opportunities for economic diversification (see Gulick & Smith and Timberlake in this book) than dedicated raw materials railroads (see Leitner in this book) or dedicated raw materials bulk shipping ports (see Bunker & Ciccantell 1995).

However, container ports and airports also facilitate cheaper imports of manufactured products that previously potentially could have been locally or regionally produced. The “tyranny of distance,” high-cost transport, very expensive and inefficient transshipment facilities outside the core, and the natural and geopolitical hazards of extranational travel reinforced developmentalist state import-substitution industrialization policies to build and maintain tariff and nontariff barriers. All of these conditions are being eliminated by technological and organizational innovations in

transport and communications, in conjunction with institutional changes in noncore states and in multilateral financial institutions, core banks, core states, and transnational corporations that previously had been willing to accommodate trade and investment flows to the material, economic, and political conditions of import-substitution industrialization as an effort to reduce spatial differentiation via the spread of manufacturing industries and raw materials processing industries. The increasing integration of the recent decades of “globalization” is accentuating longstanding differences between core and noncore regions and, in many cases, undoing efforts at reducing spatial differentiation via noncore industrialization efforts, based on changes in transport and communications.

Role of the State in the Capitalist World Economy

Although analysts of globalization have focused on the declining role of the nation-state, nation-states remain major social actors. Whether the nation-states involved are nineteenth-century core imperialist powers (Lee in this book), newly independent peripheral states formed in the late twentieth century (Omarova in this book), or semiperipheral states ascending to challenge existing core powers (the nineteenth-century United States in Leitner in this book; Bunker & Ciccantell 1995), the nation-state controls access to transport routes because of territorial sovereignty. The huge sunk costs required to build railroads, pipelines, or even large-scale ports have led core, semiperipheral, and peripheral states to play large roles in constructing and regulating transport systems. These attempts by states to control transport systems have, at times, been major contributors to economic ascent, particularly when this control is accepted or even fostered by the existing hegemon (e.g., Japan after World War II [Bunker & Ciccantell 1995]; the northeastern United States during the eighteenth century [Bunker & Ciccantell in progress]) and, when actively opposed by the existing hegemon, an effort with very limited prospects for success (India under British imperial control [Nayar in this book]). Core, peripheral, and semiperipheral states emerge in these case studies as central strategic social actors in the processes of shaping and restructuring the capitalist world economy, albeit as often fragmented and riven by conflicts between classes, class factions, and hegemonic states.

Relationship between Global and Local Processes

A great deal of interest now exists in examining the relationships between global and local processes, including how global structures and trends impact locations around the world and how local processes and particularities shape global processes. The fixity in space and the importance of local topographic, climatological, and social organization variations that shape raw materials extraction and the transport systems that link raw materials peripheries to the core provide ideal cases for examining these relationships. The impact of global processes such as core demand for raw materials, corporate investment strategies, and core state raw materials access strategies on particular locations in the periphery are readily analyzable, as are the effects of local processes and characteristics such as the availability of natural transport media, the strategies of local and national governments to utilize raw materials and transport as engines of development, and the resistance of local communities and indigenous groups to social and environmental disruptions on global processes of capital accumulation and core-periphery relations. Dunaway's chapter examines these relationships in the context of nineteenth century Appalachia as a raw materials periphery. Nayar's chapter focuses on efforts by Indian shipping firms to overcome the dominance of the British state and British firm-led liner conferences over Indian export and import flows. Gulick's discussion of conflicts over container ports in the United States illustrates these relationships in the context of core localities and manufacturing, rather than raw materials industries. The relationships between core, periphery, and semiperiphery embodied in air travel networks in the Smith and Timberlake chapter similarly link global processes to local economic and political conditions.

Transport and Capital Accumulation

Transport is the "circulatory system" of the capitalist world economy and the process of capital accumulation. Transport industries have, in many periods and nations, been a focus of capital accumulation itself, and transport is in all periods the link that binds extraction, production, consumption, and waste disposal. The period commonly referred to as the "mercantilist era" in Europe, for example, is better characterized as the era of transport capitalism, with shipping and shipbuilding industries at the center of capital accumulation and the technological, organizational, and institutional innovations that provided the foundation for the economic ascent of Holland and, later, Great Britain to hegemonic positions in the

capitalist world economy (Bunker & Ciccantell 1995; in press). Similarly, these two industries played central roles in Japanese capital accumulation after World War II (Bunker & Ciccantell 1995).

Since the end of World War II, the increasing speed and efficiency of transport media, including container shipping, bulk shipping, air travel, air freight, and telecommunications, have acted to dramatically reduce the turnover time of capital, thus, increasing the pace of capital accumulation. Reducing the turnover time of capital in the capitalist world economy has created tremendous incentives for the development of technological and organizational innovations in many sectors, particularly in communications systems that link the material processes of raw materials extraction, processing, manufacturing, and consumption (Harvey 1982). Telecommunications and computers have become leading sectors in core economies because of this quickening of the pace of capital accumulation; these technologies are the transport media for the flows of information that control these material flows.

TRANSPORT AND THE RESTRUCTURING OF THE CAPITALIST WORLD ECONOMY: A THEORETICAL SYNTHESIS

All of the theoretical insights and issues outlined above and discussed throughout this book are rooted in the relationship between the capitalist world economy and nature. The critical link in the nexus between naturally produced ecosystems and geological processes that supply the inputs necessary for industrial production and absorb the waste from these production processes and the capitalist world economy is transportation. For economies seeking to ascend within the capitalist world economy, the fundamental task is to acquire and move huge and rapidly increasing volumes of an increasingly diverse set of raw materials from their naturally determined locations to social centers of production and consumption. This task is particularly difficult for the heavy and bulky raw materials that constitute the largest share of both the bulk of industrial production and much of the built environment itself. Vast bulk and weight coupled with historically increasing distances between naturally determined locations and industrial centers make the process of transporting these raw materials a very large part of total costs and, therefore, a prime opportunity for technological and organizational innovations to reduce these costs (Bunker & Ciccantell in progress).

This process is clear in the histories of economic ascent in the core, whether the focus is on Britain and its canals and railroads of the

eighteenth and nineteenth centuries, the United States and its railroads in the nineteenth century (Mathias 1969; Chandler 1965, 1977), or Japan and its development of large-scale ports and bulk shipping in the second half of the twentieth century (Bunker & Ciccantell 1995). Resolving the problem of moving huge volumes of raw materials from their naturally determined locations to social centers of industrial production and consumption is the most difficult technological and organizational task a rising economy must confront. The tremendous potential for cost savings available from reducing transport costs and the potential demand for using the raw materials transported in the construction of transport vehicles, ports, railroad beds, and other infrastructures are the foundation for what we have termed elsewhere "generative sectors": sectors that create backward and forward linkages and stimulate a much broader range of technical skills and learning, along with formal institutions designed and funded to promote them; vast and diversified instrumental knowledge held by interdependent specialists about the rest of the world; financial institutions adapted to the requirements of large sunk costs in a variety of social and political contexts; specific formal and informal relations between firms, sectors, and states; and the form of legal distinctions between public and private and between different levels of public jurisdiction (Bunker & Ciccantell in progress).

The particular mechanisms utilized to resolve this problem of moving huge volumes of raw materials have varied over time and as hegemony and processes of capital accumulation have changed. Some of these mechanisms have included liner conferences (Nayar in this book), flags of convenience (Cafruny 1987; Bunker & Ciccantell 1995), inducing raw materials peripheries' states and firms and transnational corporations to pay the cost of transport infrastructure (Dunaway in this book; Coatsworth 1981; Lewis 1983; Bunker & Ciccantell 1995), and imperial conquest (Lee in this book), among others.

More generally, and more significant theoretically, the spatially uneven distribution of the costs and benefits of global transport infrastructure contribute directly to the economic and political inequalities that underlie and maintain the hierarchy of nations within the capitalist world-economy (see Chase-Dunn 1989). Resource-exporting nations often are unable to use this infrastructure for the diversity of purposes available to industrial economies, in part because they have less industry but also, more importantly, because raw materials seldom are located in places that favor other economic activity, as Harold Innis's (1956) studies of the role of transport systems designed to export raw materials from Canada have shown. These investments of large quantities of inflexibly sunk capital dedicated to a

single, often depleting economy provide economies in transport costs to core economies dependent on these raw materials exports to support their own industrial production. The capital sunk in these transport systems leads to the expansion of supply and the worsening of terms of trade for raw materials as these transport systems are built and expanded around the world in response to the demands of core capital. Peripheral states, firms, communities, and ecosystems bear much of the burden of extracting and transporting raw materials to the core but receive only limited benefits and assume huge costs and risks to sustain core industrial production and prosperity.

In recent decades, as the size of ships and of the port infrastructure required to load them quickly and efficiently has increased unevenly across the core, an exporting nation's investments in port facilities geared to the largest ships may tie its exports to those core nations with similarly scaled ports. The large investments required for large-scale ports create tremendous incentives for taking full advantage of the economies of scale available throughout the system. By the 1980s, for example, some Canadian, Brazilian, and Australian raw materials exporting ports designed and built under Japanese and European influence could handle ships too large to dock in the United States. The inertia of the capital sunk in these port and inland transport systems reduces the flexibility of trade relations and serves to sustain the economic and political advantages of the core nations that originally structure these transport networks in their own interests (see Bunker & Ciccantell in progress for an extended discussion of this process). These scale increases developed in bulk raw materials shipping have, in recent decades, been extended to containerized shipping, the main method of transporting manufactured goods. As Gulick's chapter points out, the increasing scale and cost of container ports to serve larger container ships require increasingly large costs to be borne by local communities and states that seek to take advantage of their local "raw material," a coastal location with topographic and tidal conditions conducive to port development, in order to maintain or improve their competitive position relative to other localities with this same "raw material," all competing for the business of a rapidly concentrating industry of fewer and larger firms with attendant economic and political power.

The discussion of this theoretical model has focused on the efforts of core states to construct these transport networks and the contribution of these networks to core capital accumulation. From the perspective of the raw materials periphery in which these inland transport systems and ports are located, these transport networks have very different impacts. Innis (1956) demonstrates the relationships between core demand for raw

materials, the transport infrastructure required to satisfy that demand, the financial instruments and agencies required to finance this infrastructure, and the forms of governance necessary to assure the debts incurred to build this transport infrastructure. Innis links Canada's articles of confederation directly to the financing of railroads and rebellions against the state to regional competition for transport. The notorious, and eventually abandoned, demand by British capitalists that Latin American nations guarantee a minimum rate of profit for railroads built to move raw material and agricultural products to exporting ports made similar demands on these nation-states.

More generally, the nation-state, its control over its own territory, and its taxation and borrowing powers appear in many instances as a hegemonically imposed device to assure the huge sunk capital needed to create the global built environment that Britain needed to channel adequate supplies of matter and energy to its rapidly growing industries (Adams 1982). Nationhood as a desired goal of Spanish colonies in the Americas was to Britain a hegemonically useful ideology. Canada became more autonomous from Britain precisely to allow it to assume the costs and guarantee the loans required to dredge canals, build locks, and construct railroads to allow the large-scale export of raw materials to Britain. The construction of railroads in India and Afghanistan required and then molded changes in local states and in the relations between them. U.S. involvement in anticolonial movements and other interventions has provided similar hegemonic benefits; like the Suez Canal before it, the construction of the Panama Canal and the aborted negotiations for a canal in Nicaragua involved the creation or subordination of nation-states.

However, the negative consequences of the construction of dedicated transport systems in raw materials peripheries for export to the core are equally clear, as Dunaway's discussion of Appalachian trade routes, Leitner's discussion of copper railroads in Michigan, and Lee's examination of western African railroads all make clear. Stephen Bunker and Paul Ciccantell (1995, in progress), Rajaram Panda (1982), and David Anderson (1987) all have discussed the negative impacts of the creation of these transport networks to serve the Japanese economy in the post-World War II era. Resolving the obstacles to capital accumulation in economically ascendant core regions via the construction of modern, efficient transport systems simultaneously tightly ties external and internal peripheries and shapes future developmental trajectories for these peripheries, a lesson the states of Kazakhstan and Azerbaijan (discussed by Omarova in this book) would do well to heed.

Within this approach to the role of transport and space in world-system theory, the world-system must be the object of analysis, and global processes are data, but we strongly affirm, against the wisdom of Immanuel Wallerstein and many of the proponents of globalization, that the nation and the nation-state must remain the unit of analysis. The complex interactions and dynamic processes that underlie the creation and the impact of generative sectors occur within bounded spaces, or places, and however much these generative sectors draw on, act within, and affect global systems, we cannot understand how they develop and change unless we locate our analysis in the places they occur. We hope that our insistence that process and location are intimately related may enrich world-systemic analysis by providing insights on how the internal processes of national development are intertwined with the ways that this development affects the global economy. This book provides powerful case studies on the roles of space and transport in the shaping and restructuring of the capitalist world economy.

OUTLINE OF THIS BOOK

This book is divided into three sections, based on the spatial and transport dimension examined. The first section focuses on the role of ocean transport in linking the terrestrially based units of the capitalist world economy. The opening chapter by Steinberg examines the role of space in the capitalist world economy and offers an extension of world-systems theory focusing explicitly on the role of space and transport. Steinberg argues that the ocean is more than simply a transport medium; the ocean in particular and transport space in general are reconceptualized as a distinct spatial and analytic dimension of the capitalist world-economy, including outer space, air space, the underground, cyberspace, and the ocean. The social construction and reconstruction of ocean space via struggles between core states and capitals as a constituent element of the capitalist world economy in different historical eras illustrate the centrality of transport space in world-systemic processes and the importance of this theoretical extension.

Nayar's chapter on the effects of imperialism and peripheral nationalism on the development of the Indian shipping industry further enhances our understanding of the role of states and firms in shaping and reconstructing the capitalist world economy. British imperial power destroyed the existing Indian shipping industry beginning in the mid-eighteenth century and actively opposed and sought to strangle Indian entrepreneurs' efforts to reestablish it throughout the colonial period. These power

relations between core and periphery, as Nayar demonstrates, shape shipping markets and industries, including the creation of the liner shipping mechanism to control cargoes on regularly scheduled shipping routes.

Gulick's chapter examines the role of containerization and, particularly, container ports as the nodes that link ocean and terrestrial transport systems. The U.S. West Coast ports studied by Gulick are central nodes in the rapidly growing economic relationship between the United States and Asia, nodes that are shaped by the actions of local and regional governments in conflict and cooperation with transnational shipping capital, domestic transport firms, and environmental and community organizations. Container shipping and intermodalism have resulted in a dramatic increase in the pace of capital accumulation and the spread of production to remote peripheries because of the reduced transport times and costs, while the market power of oligopolistic container shipping firms has enabled them to transfer the costs and risks associated with large investments in container port facilities to local governmental bodies and taxpayers.

R. Scott Frey's chapter focuses on an emerging relationship across this ocean space, the transfer of hazardous wastes from the core to the periphery along with attendant environmental and human health risks. Although the scale of this flow is extremely difficult to measure, the reduction of ocean transport costs in recent decades, the desperate economic conditions of many peripheral nations, and the increasing costs of waste disposal in core countries have created powerful incentives for this transfer of hazardous wastes, what Frey terms "antiwealth," from the core to the periphery.

The second section of the book shifts the focus to land transport systems and the relationships between raw materials peripheries and core economies. Dunaway's chapter on the trade and transport links between Appalachia and the capitalist world economy during the mid-1800s focuses on the role of inland water, road, and railroad transport systems. These transport systems and trade relations were structured by regional class struggle over the benefits from this trade and transport via a set of commodity flows controlled by a variety of middlemen through a hierarchy of intermodal transport nodes. This integration into extraregional raw materials processing and consuming centers sharply constrained opportunities for internal vertical integration and development, a common problem for raw materials peripheries.

Leitner's chapter focuses on the role of rail and Great Lakes transport in the development trajectory of the Upper Peninsula of Michigan. In his discussion of the evolution of the region's copper industry, the role of

locally, regionally, and nationally based class struggles over the transport infrastructure and, thereby, over the benefits from raw materials extraction in this internal periphery for shipment to core regions is examined in great historical detail.

Lee's chapter examines a more commonly recognized land transport link between raw materials peripheries and the core: the construction of railroads in western Africa by European core powers. The scramble for Africa included as a central component competing efforts to establish railroads in the region to further colonial exploitation of its reserves of raw materials and labor. This intercore competition took the form of a race to link these new colonies to ports from which their products could be exported to the core imperial power.

Saule Omarova's chapter on the oil industry in post-Soviet Kazakhstan and Azerbaijan provides a contemporary example of a land transport system for one raw material, petroleum, and the political and economic importance of this system for the states of the raw materials periphery and of core and semiperipheral regions as well. The characteristics of this raw material and its transport and of the international oil industry shape the strategies and conflicts detailed in the chapter.

Robert Clark's chapter seeks to synthesize a transhistorical theoretical understanding of the role of raw materials and information flows in human history, utilizing the thermodynamic concepts of entropy and dissipative structures. Within this framework, globalization is a long-term process of increasing flows of matter, energy, and information over increasing distances through a periodization of seven historical stages. Cities are the nodes and centers of these flows of matter, energy, and information.

The final chapter in the book shifts the focus again to a transport medium, the airplane, that has transformed spatial, economic, and social relations in the capitalist world economy over the past century. Smith and Timberlake examine the relationships between cities and regions of the world economy, utilizing airline passenger flows as data for a network analysis.

The afterword to this volume briefly recaps the central insights on the role of space and transport in the capitalist world economy, discusses the implications of these insights, and highlights the remaining unanswered questions that originally motivated the conference and the lines of research that still are insufficiently studied and theorized.

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I

OCEAN TRANSPORT

2

Transportation Space: A Fourth Spatial Category for the World-Systems Perspective?

Philip E. Steinberg

A key lesson of the world-systems perspective — perhaps *the* key lesson — is that space does not simply exist; it is produced. The hallmark of the perspective is its rejection of the naturalized nation-state as the unit of society (and, hence, the unit of social analysis) in favor of a system of processes that produce certain places. These places generally are characterized as dominated by core or peripheral production processes, or, when they contain a relatively even mix, they are termed “semi-peripheral.”

In this chapter, I suggest that the world-systems perspective’s tripartite division of the world into core, periphery, and semiperiphery be supplemented by a fourth socially produced category of space: the space of transportation. Movement has played a critical role in connecting the various places of the world-system and in producing its distant regions, and movement frequently occurs in dedicated transportation space. Although transportation spaces ostensibly are asocial because they are outside the “societies” (nations) governed by the state system, they are, in fact, socially produced by the place-producing processes of the capitalist world-economy, in the same manner as are the core, periphery, and semiperiphery.

To support this point, this chapter begins with a discussion of the spatial theory (and the epistemological assumptions) that underlie the world-systems perspective. It proceeds with a discussion of the unique role of movement and dedicated transportation space within the capitalist world

economy. Finally, it concludes with a brief history of the ocean as a historically significant transportation space.

RETHINKING SPATIALITY: FROM BACKGROUND GRID TO FOREGROUND OBJECT

Social scientists traditionally have conceptualized space as a static grid of locations, differentiated by physical properties, over which social relations are carried out. According to this view, space is conceptualized as context, not product:

This contextual, physicalist view of space . . . has imbued all things spatial with a lingering sense of primordiality and physical composition, objectivity, and inevitability. Space in this generalized and existential form has been conceptually incorporated into the materialist analysis of history and society in such a way as to interfere with the interpretation of human spatial organization as a social product. . . . The term spatial typically evokes the image of something physical and external to the social context and to social action, a part of the “environment,” a context *for* society — its container — rather than a structure created *by* society (Soja 1980: 209–210).¹

This liberal conceptualization of space has played an important role in facilitating capitalist processes of expansion, investment, disinvestment, and control (Foucault 1977: 141–149; Steinberg 1994; Vandergeest & Peluso 1995). If space is merely a grid, investments can be placed and removed at will. Capitalists are free to “fill” and “empty” locations on the grid as they see fit (Sack 1986). The actual movement of capital from one place to another is perceived as incidental. The cost of relocation is reduced to the price of the energy needed to move across space; “space is dissolved into flows” (Castells 1983: 314). As this cost diminishes, capital constructs the world in its own image, a free-flowing shapeless entity unhindered by the barriers of space or distance — beyond geography (Roberts 1996).

In contrast, the world-systems perspective presents an entirely different way of conceiving of space (and time). In the world-systems view, underlying social processes, themselves unstable and dialectically changing, produce specific time-spaces. Through the study of time-spaces, we may be able to discern clues to the logic(s) driving the unobservable processes that create the locations of everyday life. Through the creation of times and places, the social system creates the environments within which social

interaction occurs, and the social processes of the world-system, thereby, are reproduced and transformed.

A number of world-systems methodologists have explicitly addressed this issue of the social production of space in the world-systems perspective: "For the world-system perspective, then, the whole consists of singular processes which *form* and *reform* the relations that express patterns or structures. Parts are 'pieces' of a process, not independent of the remainder of the process but located within a specific time-place coordinate" (Bach 1982: 166). As Robert Bach goes on to note, these time-place coordinates are, themselves, socially produced: "Perhaps the most significant implication of this methodological approach to space and time is that they are liberated from the constraints of merely representing physical quantities and arbitrary standards of measure. Space and time need to be incorporated into the processes of the world-system itself: that is, we need to think of spatial and temporal processes" (Bach 1982: 179). Similarly, Terence Hopkins writes of the modern world-system: "Time in the form of its trends and cycles is, like space, constitutive of it as a system, not merely a coordinate of its properties' variations. It does not have a history or set of histories so much as it constitutes a history or set of histories" (Hopkins 1982: 148).

This turn toward conceptualizing space as socially produced mirrors a trend within geography (e.g., Harvey 1982; Lefebvre 1991; Smith 1984; Soja 1989). Commenting on this "existential link between spatiality and human agency," Edward Soja has written: "*Being, consciousness, and action are necessarily and contingently spatial*, existing not simply 'in' space but 'of' space as well. To be alive intrinsically and inescapably involves participation in the social production of space, shaping and being shaped by a constantly evolving spatiality" (Soja 1985: 177). This way of thinking, a number of geographers have suggested, should change the way that we study the world's regions, not as freestanding units to be described and, perhaps, compared and contrasted but, rather, as instantiations of the temporal and spatial patterns produced by ongoing social processes. Turning in particular to the world-systems regions of core, periphery, and semiperiphery, Peter Taylor (1987: 36) notes that these zones are neither unique, endogenously generated places nor "taxonomic aggregates." Rather, they are "constituent parts of the system [that] directly reflect the overall balance between the processes that produce them" (Taylor 1987: 36; see also Taylor 1991).

THE EVASIVE QUALITY OF TRANSPORTATION SPACE

The liberal perspective on space implies a certain way of seeing both discrete places of “society” and the spaces between in which transportation takes place. According to liberal theory, places “emerge” at certain points on the global grid. These places evolve into societies and, ultimately, states. Each society-state, as classical economics teaches us, is particularly suited to produce certain goods. Maximum wealth and happiness will come to all if these societies produce according to their comparative advantage and freely trade with one another.

It follows, according to the liberal perspective, that transportation and communications are tertiary activities. Transportation and communication support the secondary activity of trade, which, in turn, is necessary to maximize the efficiency of the primary activity of social life: production and consumption in the discrete and spatially fixed land-spaces of societies. As an activity twice removed from the essential activities of societies, transportation is treated as incidental, and the space across which it occurs is seen as a formless void — an empty grid of locations — between society. The spaces of transportation and communication are viewed as asocial voids between societies. Any social imprints that may appear in these spaces (e.g., boundaries, physical structures, military barriers) should be annihilated as quickly as possible, lest they interfere with the free flow of trade. Apolitical science — guardian of the generalized societal interest — is mobilized to obliterate the physical barriers of distance and nature that persist in these spaces.

Capitalism’s uneasy relationship with transportation, as a necessary social activity, is evidenced in contemporary accounting conventions; capitalism still has not invented a system for truly internalizing the costs of transportation. As a supposedly asocial activity, disassociated from the essential production-consumption process, it would be most simple for transportation costs to remain externalized, like the costs of environmental degradation. However, transportation costs are easily quantifiable and can be attributed to individual commodities. Unable to determine a definitive rule for valuing transportation costs, the compilers of national commodity statistics have developed a system in which these costs sometimes are included in the valuation of a commodity (as in C.I.F. [cost, insurance, and freight, or charged in full] statistics) and sometimes omitted (as in F.O.B. [free on board] statistics). Economists have difficulty acknowledging that transportation costs — generated in an ostensibly asocial space between production and consumption — are “real.”

This liberal framework, in which transportation space is perceived as external to society(s), leaves us remarkably ill-prepared for interpreting a world in which movement and flows (of information, capital, labor, resources, and commodities) are increasingly important and are taking place in ever-greater quantities, at ever-greater speeds (Brunn & Leinbach 1991; Lash & Urry 1994). Constrained by the liberal paradigm in which the space of transportation and communications is idealized as an asocial, friction-free void between societies, analysts point to this new “postmodern” world as one in which commodities are freed from the material rootedness of place that previously had characterized capitalist political economy (Baudrillard 1981). Opponents of this view, in contrast, argue that behind the cultural obsession with (and marketing of) speed and movement and behind the new phenomenon of cultural hybridity lies a system of capitalist production still very much rooted in the places of society(s) (Harvey 1989; Jameson 1992).

I argue that, to interpret this new world of flows, we must move beyond a perspective exclusively centered around the conventional spaces of “society” and spatially fixed investments. We must move beyond arguments about the extent to which production remains rooted in these places. Absent from most accounts of this new, postmodern capitalism is an attempt to understand the dynamics that produce the spaces of transportation and communication as spaces in their own right. These spaces include outer space, air space, the underground, cyberspace, and, of greatest historical importance, the sea. Elsewhere (Steinberg 1996a), I have suggested that, in the capitalist era, these spaces have been socially constructed by processes linked with those responsible for constructing the more traditional spaces of society. These spaces have emerged amidst dialectical tendencies toward capital fixity and capital mobility (Harvey 1982). Furthermore, I have argued that, at the same time as capital is intensifying its use of these spaces as transportation and communication routes (a set of practices associated with the tendency toward capital mobility and consistent with capital’s discursive construction of these spaces as friction-free and outside society), capital also is developing uses of these spaces that involve fixed investment and commodification of discrete places. Hence, these spaces will appear increasingly as sites of regulatory crisis.

In this chapter, I elucidate several of these points, with special reference to the ocean, but I have a second agenda as well: to demonstrate how the world-systems perspective provides a particularly useful lens for analyzing the significance of these transportation spaces, for interpreting the conflict underlying their formation, and for appreciating how ensuing

struggle over the (re)construction of these spaces may be indicative of deeper strains within the capitalist political-economic system. The first advantage of the world-system perspective for analyzing the dynamics underlying the social construction of transportation spaces is its refusal to accept the conventional distinction between production and trade. For Immanuel Wallerstein (1979), production is organized at the world-systemic scale, and so, trade — rather than being an external activity among independent producers — is an internal aspect of the division of labor. Because the liberal perspective's externalization of transportation (and its consequent discursive construction of the space of transportation as an asocial space) is dependent upon its construction of trade as a secondary economic activity, the world-system perspective avoids this conceptualization of transportation space as distinct from the space of society.

Second, the world-systems perspective is well-suited for analyzing transportation space because of the scope of its unit of analysis. For world-systemists, society *is* the world-system. All places within the boundaries of a regularized division of labor (i.e., an area throughout which trade regularly occurs) are part of one "society"; its various regions are parts of that society, serving different functions. Thus, according to the world-systems perspective, it makes no sense to view the world as a patchwork of land-based societies, divided by the asocial space across which goods flow in the course of trade. All spaces within the world-system are constitutive of the system, regardless of the specific social function that they serve. The space within which the movement required by the division of labor transpires is a crucial and socially constructed space within the world-system.

The third advantage of the world-systems perspective for analyzing transportation space lies in its spatial epistemology, discussed earlier in this chapter. All spaces used by society also are constitutive of society, and all spaces are produced amidst social struggle — struggle among actors and, at a more abstract level, among different tendencies and processes within the world-system. The ship at sea, like the factory on land, is creating a particular type of place in its surrounding environment, and how it goes about creating that place is dependent on its location amidst conflicting processes and actors. Conversely, as Soja (1989) points out, these processes and actors are inevitably engaged in space production. The production of space may be formalized through the adoption of rules governing the uses of that space and through discursive representations (and these rules and representations may, in turn, have an effect on future spatial constructions), but the foundational act of space production

occurs with new uses within the ever-changing structures of the capitalist world economy.

To elucidate the ways in which transportation space is produced within the modern world-system, the remainder of this chapter turns to a study of the transportation space that historically has been most significant: the sea.

THE SEA AS SOCIALLY CONSTRUCTED TRANSPORTATION SPACE

Although we commonly think of the sea as a blank void between societies, constant throughout time as a space to be crossed, the sea in fact has a long and varied history as a socially produced space. Clues to the socially constructed nature of the ocean can be found in the great variety of ocean-management regimes developed by the world's past and present civilizations. One can contrast, for instance, the ocean-space construction that predominated until recently in Micronesia with that of the Indian Ocean prior to European domination (Steinberg 1996a: 94–131; 1996b). In Micronesia, the ocean was governed largely as an extension of land. There was no concept of the “high seas”; one island's ocean-space continued until it abutted the ocean-space of another island, although the regional ocean governance system allowed substantial rights of transit through another island's space. In Micronesia, the ocean was recognized and constructed as a highly integrated space of society. This stands in sharp contrast to the Indian Ocean, where the ocean was constructed as a place entirely removed from society. The ship at sea was a sovereign extension of its home-state's territory. The sea itself was an empty space; it was off-limits as a zone for gathering or exerting social power.

Within the modern world-system, the construction of the ocean has varied greatly from era to era. This is entirely consistent with the world-system perspective on land-space. At different locations in time and space, for instance, the periphery has been constructed as a supposedly external space with little direct core control over production or governance (e.g., much of Africa before the late nineteenth century and again in the late twentieth century), a partially internalized space with considerable core control over production but little direct governance (e.g., nineteenth-century Latin America and much of the world today), or a clearly internalized space with core control over both production and governance (e.g., the Caribbean until very recent times). The specific route chosen for constructing the periphery has depended upon the relative strength of competing, dialectical processes, and tendencies within the modern

world-system. These processes are reflected in both cyclical changes and secular trends. The same processes lie behind the history of the social construction of the sea.

In analyzing the construction of ocean-space through the era of the capitalist world economy, it is useful to divide modern history into three eras: merchant capitalism (1450–1760), industrial capitalism (1760–1970), and postmodern capitalism (1970 to the present). These dates, of course, are not perfect, and they should not obscure the continuity between the eras that has been at least as significant as any changes in the manifestations of underlying capitalist processes. Nonetheless, they do provide a useful way for dividing the history of ocean-space, and the eras serve as general indicators of dominant trends within the organization of the capitalist world economy.²

Merchant Capitalism

During the early centuries of the modern world-system, there were few opportunities for profits to be realized from investment in core-area production sites (Dunford & Perrons 1983), domination of overseas possessions (Andrews 1984), or the business of shipping (Braudel 1982; Davis 1962). Substantial capital was invested in the latter two of these ventures, but only as a means to develop exclusive links between producers and consumers. The mercantilist economy was based upon closed, channeled paths of circulation within the core and between core and periphery. Indeed, according to Stephen Bunker and Paul Ciccantell (1995: 110–111), the one distinct characteristic of this early period of capitalism was the high level of profits that could be garnered through control of trade.

By controlling circulation routes, mercantilist states and their companies facilitated the flow of specie to the metropole and the funding of national budgets. Centralized power was exerted upon local production units and distant ports, but the primary goal was not control of production or domination of foreign lands; the goal was to ensure that the products from these local and distant production sites entered the national, state-controlled circulation system. Thus, for instance, the Dutch established plantations in the East Indies not to realize profit through investment but because it was the most efficient way of ensuring that trade was carried out on Dutch ships and flowed to the Netherlands (Chaudhuri 1985: 88–90). Even though the activity of trade was expensive and frequently ran at a loss, state policy supported these closed networks as a means toward minimizing the export of precious metals. Indeed, the genius of the

strongest mercantilist powers lay in their ability to triangulate this trade in such a way as to generate a net importation of precious metals (Braudel 1982).

This particular stage within the development of the capitalist world economy established a particular spatial construction of the periphery: a combination of intensive core-controlled production areas for precious metals and a small number of cash crops, coupled with a large peripheral area where the core dominated indirectly through control of long-distance trade. It also established a particular spatial construction in the ocean, the preeminent space of transportation. It follows that, in a system in which economic power was based upon controlling discrete channels of trade, the surface upon which trade was carried out (the ocean) would emerge as a site for exercising power. The control of trade routes rapidly became conflated with political domination and military might, and the deep seas became constructed as a “force-field” for exercising these forms of power. As early as the mid-fifteenth century, according to Michel Mollat du Jourdin (1993), all Europe had embraced the concept of sea power as a necessary route toward achieving economic and political power and as part of the state ideal.

It should be stressed that, although the sea was constructed as a legitimate — and necessary — arena for states to gather and exercise social power, it was not constructed as analogous to land, a possessible space suitable for absorption within the territory of the state. Rather, the sea was constructed as *res extra commercium*, a special space of commerce, outside the territory of individual states but not outside the state system (the world-system) and, therefore, not immune to the power exertions of the system’s constituent members. Thus, for instance, the 1493 Papal Bull and the 1494 Treaty of Tordesillas, although frequently described as partitioning the seas between Spain and Portugal, actually were worded carefully to grant each state policing powers only in certain regions of the sea. The documents sanctioned exclusive assertions of power in each state’s zone, but they did not grant possession. Similarly, in the early seventeenth century “Battle of the Books,” both Hugo Grotius’s vision of *mare liberum* (the free sea) and John Selden’s *mare clausum* (the enclosed sea) are based on an underlying construction of the ocean as susceptible to state power but not state possession.³ Throughout the era, the ocean, as transportation space, was constructed as an arena in which social power could be gathered and exerted in an effort to achieve control over that most precious of mercantilist goods: channeled circulation.

Industrial Capitalism

With the advent of the industrial era, the spatiality of capitalism underwent a dramatic change. Now, considerable profit could be generated by investing in production in specific places. Places on land took on new importance as locations of fixed investments. Because mass production required a mass market, places became important as consumption sites as well. In the core, this era was characterized by the rise of spatially fixed, state-sponsored investments in productive infrastructure, followed by investments in social welfare (undertaken to ensure both a base of consumers and worker reproduction). In the periphery, space was constructed through colonization (to guarantee the security of spatially fixed investments), followed by decolonization coupled with frequent military intervention (both of which were undertaken to ensure free access to these newly created investment sites), followed by the twin (if not always complementary) policies of structural adjustment (again, to ensure free access to investment sites) coupled with development aid (to buttress productive potential of foreign investment and to develop a consumer base).⁴

This was the era of the liberal spatial ideology outlined at the beginning of this chapter. “Society” occurred on land-space, where reason could be applied to investment decisions, causing a place to progress and develop. Thus, some locations on the world’s spatial grid progressed, although others — those locations not suitable for spatially fixed investments — were defined as “other” spaces, not amenable to investment, development, or civilization. The ocean came to be defined as one of these “other” spaces.⁵ The fact that trade, a crucial economic activity, continued to occur primarily at sea was irrelevant. Trade was defined under capitalism as a secondary activity. Summarizing the views of core powers at the Congress of Vienna (1815), Edgar Gold writes:

For most European countries, commerce was no longer “fashionable” nor something on which great amounts of energy needed to be expended. Commerce was considered to be sufficiently self-motivated and self-perpetuating that whatever loose regulation it needed could be supplied by lesser government bodies. As long as commerce could provide a convenient tax base for government ambitions, necessary employment for the expanding population, and new markets for imports and exports, it was left to its own devices. Ocean transportation, as a part of the commercial structure, fitted well into this *laissez-faire* philosophy. (Gold 1981: 80)

This is not to say that control of maritime transport was not, throughout the industrial era, on the agenda of hegemon and would-be hegemon

(see, for instance, Bunker & Ciccantell's [1995] discussion of the role of ocean transport in Japanese post-World War II development). However, with the denigrated importance of transportation as an economic activity in its own right, hegemonic players sought to develop maritime transport regimes that reflected their diverse interests and their desire for systemic stability rather than promoting regimes crudely calculated to multiply their social power and enable accumulation of economic rents (Cafruny 1987).

The ocean, although still very much a socially constructed space serving necessary transportation functions for the capitalist world economy, was rhetorically constructed as an asocial void distinct from the discrete spaces of nations, states, and societies where development, progress, and civilization occurred. Thus, Melville was able to write in his 1849 novel *Redburn*, "Sailors go round the world without going *into* it" (cited in Kindleberger 1992: 60). This phrase is incomprehensible from a world-systems perspective: by going "round" the world, one participates in the social process of creating the world. However, from the liberal spatial perspective, one can envision the sailor gliding across the empty surfaces of the grid without going "into" the places where social life occurs.

This denigration of the sea as a space outside society can be seen in the international laws adopted to regulate such ocean activities as shipping and piracy. When maritime law was codified in the late nineteenth century, it was quite consciously taken out of the hands of territorial states and given to the industry to self-regulate, for fear that states might apply their territorial paradigm to the sea and diminish the ocean's construction as a formless void across which ships of all nations freely traveled (Gold 1981). Likewise, early nineteenth-century jurists seeking to eliminate piracy chose not to empower states to police the sea; instead, ships not flying a national flag — that is, ships not claiming allegiance and rootedness in one of the civilized "places" of the land — were declared to be of the wild, of the anticivilization of the sea, and were declared, in international law, *hostis humani generis*, the enemy of humankind (Thomson 1994).

Similarly, rationalist representations of the era portrayed the sea as an empty space devoid of social (or even natural) imprints (e.g., the blank blue spaces on maps). In contrast, but in a complementary vein, romantics heralded the sea as representing the antithesis of modern civilization. For romantics, the sea was a space of premodern Christian morality (as in Samuel Coleridge's *Rime of the Ancient Mariner*) or the hierarchical "natural order" of things (as in several of Joseph Conrad's novels) or anarchic escape from the terrors of nationalism (as in Jules Verne's *20,000 Leagues Under the Sea*) or simply an antisocial space of nature (as in the marine

art of Homer and Turner). For rationalists who favored the advance of modernity, the sea was to be crossed as quickly as possible, and any barriers that might arise to block the path of free trade — be these barriers erected by nature, society, or simply distance — were to be demolished.

Postmodern Capitalism

With the rise of postmodern capitalism, the capitalist world economy has come to rely more than ever on movement, and these flows continue to take place primarily at sea, fiber optics, satellite communications, and air travel notwithstanding. Thus, the world-system continues to construct the ocean as a formless, friction-free transportation surface, a great void across which capital freely moves. As Christopher Connery (1994: 56) notes, “[The ocean] is capital’s favored myth element.”

At the same time, however, new uses of ocean-space are emerging that threaten the existence of the deep sea as dedicated transportation space. Even as the ocean becomes ever-more important as transportation space, it is also of increasing importance as a site of intense investment in the exploitation of both living and nonliving resources. Perhaps most significant among these resources (in potential for disrupting the system, if not in potential economic value) are the polymetallic manganese nodules that lie on the ocean floor beyond the continental shelf. Mining these nodules would require substantial spatially fixed investments in discrete areas of ocean-space. As United Nations (UN) negotiations surrounding the construction of a nodule mining regime revealed, miners would require the protection of a territorial entity to guarantee the security of their immobile investments in the deep sea. However, the application of territorial control to the sea is anathema to the construction of the ocean as a formless transportation surface, a use of the sea that continues to grow under postmodern capitalism. Thus, the ocean is emerging as a site of conflict between two contradictory tendencies within the underlying processes of the capitalist world economy: the tendency toward capital mobility (exemplified in the prevailing industrial capitalist construction) and the tendency toward capital fixity (exemplified by the pressures favoring valuation and ownership of discrete points in ocean-space and the commodification of its resources).

CONCLUSION: TRANSPORTATION SPACES AS SITES OF CRISIS AND OPPORTUNITY

David Harvey (1982), when discussing these two conflicting spatial tendencies of capital (mobility and fixity), notes that the contradiction

generally is resolved through a “spatial fix.” Perhaps capital will resolve its current crisis in the ocean with a spatial fix, commodifying and territorializing discrete places in the ocean while relegating communication and transportation to a less-possessible frontier like inner-atmospheric or outer-atmospheric air space. Alternately, capital may continue to attempt a spatial fix *within* the ocean, dividing the sea between a coastal zone in which individual states guarantee fixed investment and resource extraction and a deep sea zone in which a regime based upon the primacy of mobility prevails. The long-run prospects for this spatial fix appear dim, however; too many resources, some of them demanding fixed investments in discrete areas of ocean-space, are emerging in the deep sea. Capital appears equally resistant to adopting a “social fix.” Efforts in the UN to establish an innovative regime for undertaking manganese nodule mining, in which production would be carried out in part by a UN company operating in UN-controlled space, were rejected by the core powers as incompatible with the capitalist system.⁶

Although the ocean is the transportation-communication space with the longest history, it is not the only such space, nor is it the only space where there is a contradiction between the capitalist world economy’s need for movement and its need for investment opportunities. In the ocean, this contradiction is largely between the construction of the ocean as transportation space and its potential as a site of other resources. In cyberspace, by contrast, the contradiction is between those who have an interest in the free flow of information and those who seek commodification of those same information resources (see, for instance, the current debate over privatization of the Internet). In both spaces, however, there is an emergent contradiction, and the very fact that core powers would even consider a social fix to the situation (as they did in the case of the manganese nodule regime) indicates that resolution of this contradiction will not be simple and may involve substantial systemic transformation.⁷

As was noted earlier, the world-systems perspective is particularly well-suited for analyzing the contradictions and opportunities presented by these spaces of transportation and communication. The perspective challenges the liberal view of the world as composed of distinct societies. By adopting a world-systems perspective, it becomes possible to see the uninhabited spaces across which extensive trade and interaction occur not as formless voids *between* societies but rather as constructed spaces *within* society. These transportation spaces do not fall into any of the three categories of space commonly identified with the world-systems perspective (core, periphery, and semiperiphery), but it follows from the logic of the perspective that transportation space, like the three “traditional”

world-systems spatial categories, serves a crucial role in the reproduction and development of the world-system and that it historically has been constructed and regulated as one unique element of social space so as to better serve the system's functions.

Like the other spatial categories within the capitalist world economy, transportation, and communication spaces are unstable. Indeed, these spaces are particularly unstable, because they lie at the intersection of capitalism's two contradictory spatial properties: on the one hand, the tendency toward movement of an ever-greater quantity of capital at ever-greater speeds and, on the other hand, the tendency toward commodification of new products and the conquest-creation of new places as potential sites for locating fixed investments. Like the core, periphery, and semiperiphery, transportation spaces have been constructed differently in different eras, but the overall effect of spatial constructions — in all of these spaces — has been to reproduce, advance, and transform the underlying logic of the capitalist world economy. Thus, the world-systems perspective should supplement its tripartite division of the world with a fourth space: the space of transportation.

NOTES

1. Because of its ties with liberal economic thought (discussed below), this perspective on space will be called, for shorthand, the "liberal" perspective.

2. The history of the territorial construction of ocean-space that follows can be found in much greater detail in Philip Steinberg (1996a).

3. For the textual evidence supporting these statements, see Steinberg (1996a: 176–183) for an analysis of the Papal Bull and the Treaty of Tordesillas and Steinberg (1996a: 186–200) for an analysis of the "Battle of the Books."

4. This is, of course, a very crude summary of both core- and periphery-producing actions in the industrial capitalist era, in which I have highlighted the economic functions of political interventions. Not noted here, for instance, is the influence of such factors as resistance, ideology, and articulation with existing societies formerly outside the world-system.

5. There is a large body of literature on the role played by the "othering" of subordinate people in Western, masculinist systems of domination (e.g., Trinh 1989). Of particular note here are those who stress the "othering" not just of subordinate people but of subordinate places (e.g., Jarosz 1992; Said 1993: 58–59; 1994: 21). For a discussion of contemporary "othering" of peripheral places, see Emery Roe's (1995) analysis of the media-generated continent of "Except-Africa."

6. The history of the manganese nodule regime is considerably more complex. In fact, the United States, under pressure to establish a regime that would

allow mining to commence and faced with a situation that could not be resolved easily within the existing productive and territorial institutions of the world-system, did for a time support the nodule regime. When a host of political, economic, and military priorities changed and demand for a workable mining regime diminished, however, the United States and other core powers withdrew their support. For critical analyses of the manganese nodule saga, see Alfredo Robles (1996) and Steinberg (1996a: 319–330).

7. For more on the role of transportation spaces (particularly the ocean) in imagining and constructing historic antisystemic movements and future postcapitalist social organization, see Steinberg (1996a: 341–351; 1997).

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3

Power and the Shaping of Markets: The Global Order, Imperialism, and Shipping Nationalism

Baldev Raj Nayar

States and markets are interactive social organizations even as they have their own separate arenas and separate logics (Gilpin 1987: 10). In some respects, overseas shipping seems like an exception to this general proposition. For one thing, shipping often is described as an international industry. Such a description implies that, unlike other industries that are located inside the territorial boundaries of the state and, thus, subject to regulation by it, shipping essentially operates on the open seas between the boundaries of states. Beyond that, the description also seems to underline the dominant role of the forces of the market rather than of the state. For example, freight rates, at least in bulk shipping, are determined by the forces of demand and supply in the international market. Further, booms and recessions in the industry quickly spread throughout the world's shipping and affect the fortunes of national merchant fleets. Also, more than 37 percent of the world's fleet now sails under "flags of convenience" (UNCTAD 1993: 20–22), indicating that they essentially operate outside the control of states.

Notwithstanding these known facets of the shipping industry, however, this chapter demonstrates the elemental role of states and, therefore, of their relative power in shaping the market in the case of the shipping industry. This is done in two ways, both with a considerable dose of history as a necessary cure for any misconception about shipping being largely immune from politics. First, the chapter analyzes the nature of the

interaction between states and markets in the organization of the normative framework for the operation of the industry at the international level. Second, on a narrower scale, the chapter discusses the impact of imperialism — a more brutal form of the domination of powerful states over others — as well as the impact of its nemesis, nationalism, on shipping and shipping policy in colonial India. Together, these two parts of the discussion serve forcefully to confirm the fundamental role power plays in the shaping of markets and dispel any notion that shipping is a sphere of economics alone.

THE NORMATIVE STRUCTURE OF WORLD SHIPPING

The term “international regime” is a shorthand concept in the discipline of international political economy for the overall framework of rules and norms in accordance with which activity is carried out between states in a given sector (Krasner 1983: 2). At one level, regimes can be treated as autonomous and self-contained systems, governing conduct in one or another economic sector. At another level, they can be seen as related to the structure of power in the international system, though the precise nature of that relationship is a matter of contention in the discipline.

Three approaches to the question of the relationship of power to international regimes can be distinguished (Nayar 1995). In political realism, international regimes are taken to be epiphenomenal. In this view, regimes are simply a reflection of the underlying distribution of power, that is, a dominant state or set of dominant states in a given configuration of power usually finds a particular normative framework more appropriate to serve its interests and is able, through coercion or consensus, to make it prevail in the international system. In this interpretation, then, international regimes last as long as the given balance of power lasts, only to be replaced by a new international regime consonant with the changed balance of power. What political realism does in its treatment of international regimes is underline the centrality of power in the construction and maintenance of regimes, which otherwise may seem as purely economic or technical in nature.

In contrast to realism, the approach of institutionalism sees, notwithstanding the pervasive interstate conflict, the gradual but parallel emergence in the world of an international society centering on cooperation among states. In an increasingly interdependent world where elites are compelled to interact repeatedly, the institutionalists maintain that social practices or regularized patterns of behavior develop. As these persist,

they acquire a normative aura and come to act as constraints on the behavior of leaders. A third approach, known as modified structural realism, endeavors to build a synthesis between the two approaches. Although taking the state to be a rational, egoistic, utility-maximizing actor, this approach holds cooperation between states to be both necessary and possible. Utility maximization is not seen as a bar to cooperation but, rather, requires and induces cooperation because, in the absence of cooperation, the result would be suboptimal outcomes for most parties. Once patterns of cooperation are, thus, established to coordinate state behavior, they tend to persist because of the functions they perform and, in turn, come to influence state behavior.

Although focusing on the short term may show the approaches of institutionalism and modified structural realism to be not without merit, a long-term perspective reveals the potent relationship between power and regimes. In a pioneering analysis of the changing regimes in shipping, Alan Cafruny (1987) convincingly demonstrates the relationship of the rise and decline of hegemonic power to a succession of shipping regimes. The emergence of Dutch maritime supremacy at the beginning of the seventeenth century, after the defeat of Spain by England, led to the inauguration of a liberal shipping regime, legitimized by an appropriate ideology of the freedom of the seas propagated by Hugo Grotius. The liberal regime proved premature and short-lived, however, because England refused to accept it, pursuing instead protectionist policies through a series of navigation laws. The end of Dutch supremacy over the seas at the hands of England in 1674 did not produce a new hegemonic power, with the result that mercantilism characterized the shipping order.

The defeat of France in the first quarter of the nineteenth century — combined with Britain's rise as the first modern industrial power along with the technological breakthrough of steamship navigation in the second quarter — made Britain's position as a maritime power unassailable. As the ascendant hegemonic power, Britain fostered from the mid-nineteenth century onward a liberal shipping regime, though perhaps more accurately it should be described as only a regime of private ownership because of the cartelistic features that came to be associated with it. The decline of British hegemony by the beginning of the twentieth century led to most states pursuing protectionist policies in shipping as in other areas. The emergence of the United States to hegemonic status after World War II brought into being in the immediate postwar period an international regime with two pillars. One pillar accommodated Europe's maritime interests by the reinstallation of the regime that had prevailed before World War II in liner shipping; the other sought to protect the interests of

vertically integrated U.S. multinationals in the bulk carriage of oil and raw materials through the system of flags of convenience. By the end of the 1960s, the decline of U.S. hegemony, combined with U.S. strength in container shipping, which it pioneered as a technological breakthrough, led to a tougher posture in support of competition in liner shipping.

It is, thus, abundantly clear that, first, regimes are not a permanent condition but change frequently and, second, that the change is associated with the power and interests of dominant states. Rather than being self-contained systems of norms and rules for the conduct of international business and commerce, regimes are related to underlying structures of power and interests.

Regime Types and Authoritative Allocation

International regimes have been distinguished according to whether the direct or indirect allocation of resources and property rights is made by political authorities or takes place on the basis of the preferences and endowments of individual actors in the market. Employing this state-market dimension, Stephen Krasner (1985: 196–226) draws a sharp contrast between the international regime for aviation and that for shipping. The former is characterized as resting on authoritative allocation and the latter on market-based allocation. Such an ahistorical treatment, however, is remarkable for simply taking the contemporary scene, even then selectively, as the point of departure for typology construction into unqualified polar opposites, apparently in an endeavor to delegitimize the concerns of the developing world about economic and political domination. The impact of such a treatment can be enormous, because it both follows and foreshadows a barrage of propaganda on behalf of the economic and political interests of the industrialized world, aimed against the aspirations of the less-developed areas. However, the treatment is mistaken in several respects.

In the first place, it creates the false illusion that the division of labor and the hierarchy in maritime power in the shipping world is simply the consequence of the working out of autonomous market forces on the basis of the natural endowments of the actors, untrammelled by authoritative allocation. The reality is otherwise. The maritime power of both the United Kingdom (UK) and the United States, two arch defenders of the marketplace in shipping and elsewhere, was built on the most thoroughgoing state intervention and mercantilism (Sturmeay 1962; Cafruny 1987). The shipping policies of the UK over the period from the mid-seventeenth to the mid-nineteenth century became a model of shipping nationalism later

for others in Europe, the United States, and developing countries. The subsequent turn to liberalism on the part of the UK was based on a conscious judgment that its established superior capabilities had outstripped those of its rivals to such an extent that there was more profit in competition than protection. That did not, however, mean an end to retaining the empire as a special preserve for British shipping.

Moreover, the advanced industrial states continue to play an active role in the nurturing of their fleets through a variety of interventionary and regulatory mechanisms that mold the market for the purpose. Although protectionist measures of various kinds are fairly generalized throughout the Western world, the United States has few peers in the magnitude and scope of support provided to its shipping. The U.S. armory for the promotion of its shipping includes policy instruments in the three areas of protection, subsidy, and economic regulation (Jantscher 1975; Kilgour 1975; Lawrence 1966, 1972; White 1988). Over the 50-year period from 1936 to 1985, the United States provided more than \$35 billion in 1985 dollars in subsidies to U.S. shipping (White 1988: 69–84).

There can be no doubt that the heavy involvement by the U.S. state through protection, subsidies, and regulation enormously distorts the operations of the world's shipping market. What is amazing in respect of the United States, however, is the glaring incongruence between its shrill and moralistic lecturing to all and sundry on the superiority of the freedom of the market and the simultaneous practice of protectionist measures on behalf of its own shipping industry. In what to others appears as sheer hypocrisy, the United States sees no contradiction between its rejection of the reform efforts by the developing world to regulate shipping cartels and its own protectionist and regulatory regime. It resolves the dilemma by the simple device of denying that it follows any discriminatory practices, and it is a testimony to U.S. power that it can prevent discussion of them (Franklin 1968: 129, 239, 336). What is more, the United States threatens others with unilateral reprisals if they attempt to do what it does for the protection of its own shipping, charging that they violate its conception of the free market.

The actual market in world shipping has been dominated by quasi-monopolistic cartels of major shipping companies in liner shipping and by the vertically integrated operations of powerful multinational corporations in bulk carrier and tanker fleets. These features of the market situation represent strong barriers to entry. It cannot be maintained that they are simply consequences of the working of the market, having little to do with extramarket forces. Both the U.S. and British states have conducted periodic inquiries into the prevalent restrictive shipping arrangements and

have decided to accept them, even as they have regulated them when they deemed it to be necessary. These arrangements have, thus, not been just a result of some autonomous market forces but constitute an allocative framework that has been accepted by certain states because it was perceived beneficial to their overall economic and national interests. In the pursuit of those very interests, the same states have worked actively for the protection of that existing framework once the developing world began to challenge it. It would seem, therefore, that the characterization of the existing regime as market based, whether by scholars or policy-makers, has served to depict the efforts of the developing world one-sidedly as some novel and illegitimate invasion by authoritative allocation into some presumed ongoing market-based international regime.

In the light of actual practice among nations, the view of the international regime in shipping as one entirely based on allocation through the market is in serious error. Authoritative allocation played a major role in the building of merchant fleets and continues to do so in protecting and promoting them. However, it would be equally a mistake to view even the area outside authoritative allocation as representing the operation of a free market, because, well into the second half of the twentieth century, the power of Western states upheld a structure of world shipping that by design created powerful barriers to entry by newcomers, especially of the less-developed areas.

The Restrictive Institutional Structure in Liner Shipping

Although the restrictive nature of the market structure impinges on the less-developed countries throughout the shipping industry, the liner shipping sector has been of particular concern to them, because of its link with exports of manufactured goods and its carriage of high-value cargo. However, the market structure of the liner shipping industry has for more than a century been dominated by cartels, known as “conferences.” The conference system began in 1875, when British liner companies in the UK-Calcutta trade formed the Calcutta conference. The system then spread quickly, and by the beginning of the twentieth century, the entire liner shipping of the world had become cartelized under British leadership, marking an end to the brief period of shipping liberalism. For the developing world, however, they were not just functional equivalents of colonialism (Cafruny 1987); rather, they were the very manifestation and instrument of imperialism, which in the ultimate analysis undergirded the system.

The most elaborate and thoroughgoing defense of the conference system in recent years has been offered by Gunnar Sletmo and Ernest Williams (1981). Fundamentally, liner shipping is differentiated from the charter operations of bulk carriers and tankers by its being structured to provide scheduled services on fixed routes as a common carrier in a fluctuating market. For the two authors, the dilemma for liner shipping lies in the "unique combination" of two characteristics that are built into it, that is, the high proportion of fixed costs on the supply side and the smallness of the size of shipments relative to the capacity of the vessel on the demand side. The likely consequence of the high ratio of fixed costs relative to variable costs in the liner industry is price volatility and firm bankruptcies and, therefore, market instability, all of which is no less damaging for shippers than it is for shipowners. There emerges, therefore, the need for coordination and rationalization among shipowners in respect to capacity, sailings, and freight rates, and even pooling of revenues and profits. The mechanism of conferences or agreements among shipowners is engineered precisely to meet this need. The very nature of the liner shipping industry, thus, makes its economic survival dependent upon cartelization. In turn, cartelization enables shipowners to provide shippers with stability in service and rates. In this manner, the consequences of restraint on competition emerge as superior to those associated with free competition. Sletmo and Williams, therefore, question the applicability of the U.S. antitrust doctrine to each and every industry without regard to its particular nature.

It quickly can be conceded that there is a genuine need for coordination among shipping companies through the mechanism of conferences. However, what initially originates as a rational constraint on competition, for the sake of coordination, tends to become anticompetitive not only for shippers but also for liner companies, both inside and outside the conferences. Although differences exist among the 350 to 400 conferences, most of those outside the U.S. trades have been "closed." As quasi-monopolies, their chief aim has been to eliminate price competition among the members and to bar entry of new competitors. Invariably, given the quasi-monopoly position of the conferences, the initial aim of minimization of losses becomes transformed into the maximization of gains. The resulting high rates then often attract new competitors, generating a problem that the system originally was conceived to prevent — overtonnage — necessitating, in turn, collusive action to kill competition.

The conferences attempt to retain their monopoly in the market by tying their clients through loyalty contracts in the form of dual rates (which privilege clients for their exclusive patronage) and deferred

rebates (which are promised refunds but with their availability conditional on continued use of conference services). They endeavor to defeat new competitors by excluding them from membership and attempting to eliminate them from the market through the mechanism of "fighting ships," the sole function of which is to inflict losses on competitors by offering cutthroat rates. Deferred rebates and fighting ships have been the conference system's "two great predatory weapons" (Sturmey 1962: 340).

The closed membership of the conferences can be especially effective against the developing countries, given the limited resources of their lines, and the conferences were not reluctant to exercise this leverage, much to the detriment of the shipping of developing countries and the consternation of their decision makers. In no little measure, the subsequent adoption of measures of flag preference and the larger movement among the developing countries for the reform of the conference system through international regulation were provoked by the restrictive practices of conferences, dominated by Western countries, especially Great Britain (Knudsen 1973: 62). On the other hand, business and political leaders in Western countries railed in chorus against what they characterized as flag discrimination by the developing countries, ignoring the whole complex of discriminatory and monopolistic practices of their own that strangled the shipping of the developing world.

As against the monopolistic tendency inherent in liner shipping, the competitive tendency, too, can manifest itself from time to time to limit the power of conferences. Shipping is not only an international industry but also a dynamic one, given to frequent change. The conference system can break down at times, and some new competitors may break through the restraints imposed even by closed membership. However, it would seem that the really crucial factor in moderating the monopolistic tendency of the conference system is countervailing power. One possible source of such countervailing power can be shippers, but for a variety of reasons, shippers failed to organize into shippers' councils until the 1960s. Another source of countervailing power can be alternative means of cargo transport, such as air transport; the latter, however, did not arise on any significant scale until the early 1970s, with the launching of jumbo jets. The most potent source of countervailing power, however, has been the state. This is evident most prominently in the United States, where, early on, the Shipping Act of 1916 mandated open conferences in its trades, barred deferred rebates and fighting ships, and required filing of rates fixed by conferences in order to determine their fairness.

On the other hand, what India as a colony faced before 1947 was the absence of countervailing power. In that case, state power was lodged in

the imperial power wherefrom the shipowners came and on which they were able to count for support. On the other hand, shippers in the colony were helpless; being small-scale and dispersed, they could not afford to defy shipowners who had the backing of the empire. More importantly, the absence of countervailing power against the monopoly power of the imperial shipowners proved crushing for the maritime aspirations of local entrepreneurs. The sovereignty of the state and, more importantly, the exercise of that sovereignty is, thus, fundamental to the survival of a national merchant fleet.

IMPERIALISM AND THE ANNIHILATION OF LOCAL SHIPPING

The maritime achievements of India's coastal peoples have been rightly celebrated by nationalist historians such as Radha Mukerji (1912) and K. M. Panikkar (1947). Long before the entry of the Portuguese into the Indian Ocean in the middle of the second millennium, India had developed maritime capabilities of a high order. The initiation of the British empire in the mid-eighteenth century, however, started a process of the decline of Indian shipping, resulting eventually in its annihilation. That outcome was, first and foremost, a function of the lack of political sovereignty, because the state was now in the control of a foreign power and was structured to serve its military and material interests. Technological change also fed into the outcome, but the failure in successful adaptation to it was fundamentally a consequence of the absence of political autonomy, because there was no lack of local enterprise and talent. The ultimate result of British imperialism was a thoroughgoing destruction of India's maritime capabilities and the institution of an extreme "underdevelopment and dependency" instead. Indeed, shipping seems to have been an area marked for special intolerance of the existence or rise of local capabilities. Although local entrepreneurs were tolerated (though not encouraged) in other industries, such as textiles, somehow shipping was considered central to the structure of imperialism, and, therefore, local competitors were crushed. Local efforts at building a merchant fleet invariably faced not only indifference and neglect but also hostility from the colonial state that represented the interests of the metropolitan, rather than national, shipping.

The historian Frank Broeze (1984) divides the impact of British colonial rule on India's maritime industries into three periods: from the foundation of the British empire in India in the mid-eighteenth century to the mid-nineteenth century, from the mid-nineteenth century to World War I,

and the years between the two world wars. In the first period, with the establishment of British naval hegemony in the Indian Ocean, Indian trade expanded rapidly, and new trade networks were opened to areas colonized by the British. Naturally, British shipping exploited the opportunities that its empire had opened, and the balance between British and Indian shipping was transformed. However, Indian shipping was not yet completely marginalized; that would require the intervention of politics, because Indian and British shipping technology and organization were quite similar. Indeed, British shipowners in the region themselves depended on Indian shipyards, the most well-known of which was that owned by the Wadias. The Royal Navy even acquired a number of warships from the Wadias. Soon, ships built in India entered the overseas trade with Britain, and the Napoleonic wars compelled Britain to charter tonnage from India.

However, once the wars ended, the British shipping and shipbuilding industry raised the specter of threat to its monopoly. The British state responded to the pressures of the shipping lobby with the Registry Act in 1815, which prohibited the registration of ships built in India, thus, in effect barring their sale to British shipowners. In addition, the same act imposed severe restrictions on the hiring of Indians on British ships. As the demand for India-built ships fell, Indian shipyards fell into disuse. On the other hand, British shipowners now were allowed to send smaller ships into the Indian Ocean, which enabled British shipping to enter India's coastal and regional trades. Imperialism, thus, not surprisingly, placed British shipping and Indian shipping on an unequal footing. Although British ships were free to operate in the coastal and overseas trades of India, Indian ships effectively were barred from the corresponding trades of Great Britain. Moreover, the British vessels now required higher skills to operate, the training for which was not available to local crews. Imperialism, thus, proved destructive of Indian maritime capabilities in respect to all three requirements of ships, shipbuilding, and seafarers.

In the second period, from the mid-nineteenth century to World War I, the new technology of steamships, combined with the discriminatory treatment in favor of British shipping, led to the disappearance of India from almost all parts of the industry. The commanding superiority of the new technology was reinforced by a British program of mail subsidies for a global imperial network. As a consequence, British shipping became more and more technologically developed while Indian shipping became increasingly underdeveloped.

In this new situation, there arose the virtual monopoly over India's coastal and overseas trades by two British shipowning firms — Peninsular and Oriental Steam Navigation Company (usually referred to as

simply P&O) and British Indian Steamship Navigation Company (BISN or just BI). In 1914, near the end of the second period, the earlier cooperation and collaboration between the two was replaced by a merger. The patronage of the colonial power was critical to their ascendance in shipping. Massive mail subsidies from the British and Indian governments helped them establish their wide route networks. With both companies providing troop carriers for the empire, the British government and shipping firms were tightly linked in support of British imperialism. As a consequence, both companies flourished and achieved a stranglehold in India's trades, and the two together strode like a colossus in the Indian Ocean from the Suez to the Far East on the ruins of innumerable rivals who were eliminated in the process. The ascendancy of these shipping behemoths was fortified with the instituting of the conference system, which, not fortuitously, began in India with the Calcutta Liners Conference in 1875. The decisive weapons in the destruction of their rivals were deferred rebating and predatory pricing.

The domination of BISN in India's trades did not put an end to the Indian quest for a role in shipping even though its bearers were not the traditional shipowners but modern industrialists and businessmen. There was no lack of enterprise because, between 1860 and 1925, a total of 102 shipping companies with a capital of Rs. 460 million are said to have been started. However, most went into liquidation; as *Statesman* editor Sir Alfred Watson remarked before a legislative committee in the late 1920s, "Indian company after Indian company which endeavoured to develop a coastal service has been financially shattered by the heavy combination of the British interests" (Jog 1969: 13; Rao 1965: 74, 76).

The fate that Indian entrepreneurship met at the hands of British shipping interests is vividly illustrated by the story of the Tata Line, started by J. N. Tata, the venerable head of India's largest industrial empire at the time and later the founder of the modern steel industry in India. Tata found that P&O was charging high freight rates for exports of yarn from his textile mills even as it gave secret rebates to collaborator firms, with the result that he was being priced out of the Far East markets. He repeatedly tried to get P&O to lower the freight rates, but to no avail. He then endeavored to mobilize the cooperation of two foreign firms, which, however, left him in the lurch after a year of stiff competition; indeed, they joined up with P&O, with the combined cartel raising the rates even higher.

Frustrated, Tata determined to set up his own shipping line. No doubt, he saw economic benefit in protecting his yarn exports, but "patriotic motives of founding the nucleus of a modern Indian merchant marine fired his zeal" (Rao 1965: 68). Similar motives were to inspire his

subsequent decision to pioneer the steel industry. The task was daunting in either case: "It indeed required a good deal of courage to fight the P&O which had immense resources and was firmly entrenched in the trade. But Shri Tata did not lack courage" (Rao 1965: 68). Tata entered into an agreement with Nippon Yusen Kaisha of Japan and started a new line called the Tata Line as a joint venture, with both parties bearing equal risk. A rate war followed, with P&O and its fellow members in the cartel drastically lowering the rates and making "the unusual offer of carrying cotton to Japan free of charge" (Rao 1965: 68–69). Struck by the cutthroat competition, Tata complained bitterly to the British government about the underhanded practices of P&O and its ring members, but the effort proved futile. Undercut by the deferred rebates, Tata lost the battle; as his biographer sadly acknowledged, "For once Mr. Tata was beaten" (F. R. Harris, cited in Rao 1965: 70). With the Tata Line crushed, P&O immediately raised the rates.

A fate similar to that of the Tata Line befell the Swadeshi Steamship Company, which had been founded in 1906 by the South Indian nationalist leader Chidambaran Pillai for service between Tuticorin and Colombo. This company was heavily invested with the symbolism of economic nationalism, paralleling the rise of the militant phase in nationalism in the political sphere. Again, BISN launched a fierce rate war, bringing the company to its knees. Another shipping company established in eastern India in 1905 was the Bengal Steamship Company. It flourished initially, but then a freight war launched by BISN destroyed it also.

The case of the Tata Line is instructive not only for the indifference of the government to its fate but also, not unrelatedly, for the cynical recognition of power by P&O. The same P&O that was intolerant toward Indian competition had a sharply different posture toward Japanese and European shipping lines, with which it was ready to reach an accommodation because they were backed by their governments (Broeze 1984). The fate of the Tata Line stood as a chastening lesson to Indian entrepreneurs who dreamed of venturing into shipping. However, they refused to be intimidated, and countless new attempts were made, only to be vanquished on the rocks of the rate wars. Such was the pattern that lasted until the end of World War I. Then, in 1919, another group of visionaries started a new venture that in retrospect dazzles the imagination for its sheer daring and determination. The product of their labors, Scindia Steam Navigation Company, became in due course the nucleus of independent India's modern merchant fleet. However, before that could happen, the enterprise went through more than a quarter century of harsh conflict and struggle, with its survival constituting the stuff of legends. Indeed, the

history of Indian shipping between World War I and Indian independence in 1947 became essentially the story of Scindia's struggle to survive, defying the insuperable obstacles set against it.

THE "SAGA OF SCINDIA" AND THE RISE OF SHIPPING NATIONALISM

Worthy of admiration as Scindia's struggle may have been, its survival was not entirely the outcome of the ingenuity and grit of its entrepreneurs, enormously skillful undoubtedly though they were. It was also a consequence of the changed economic and political context in India. World War I saw the expansion of local industry and, relatedly, the consolidation of a national capitalist class and the accumulation of capital in its hands from huge wartime profits. These new elements provided both the base and the desire for diversification away from traditional industries such as sugar and textiles. In the political arena, the end of the war saw the intensification and transformation of the nationalist movement. Mahatma Gandhi transformed the movement from an intermittent gathering of the narrow, urban-based, English-educated middle class into a mass movement that encompassed that middle class plus the rich and middle peasantry of the rural areas, even as it was supported financially by the newly consolidated capitalist class. It was this confluence of factors that proved critical in facilitating the survival of Scindia. The leaders in the shipping venture themselves were not unaffected by the nationalist movement. They may not have been without the profit motive, but no profit motive alone could have withstood for a moment the terror that BISN's name struck in the hearts of those who aspired to be shipowners, and they all were familiar with the fate of past efforts at the hands of BISN. They were moved by patriotism, and they took their effort to be an expression of nationalism in the economic sphere. Nationalist leaders, in turn, looked at Scindia with awe and admiration for its grit and determination and rose to support it to the extent that they could under foreign rule.

Remarkably, notwithstanding its hallowed place in the history of shipping nationalism in India, Scindia was in its immediate origins a result of fortuitous circumstance. An Indian businessman of boundless curiosity and energy, Walchand Hirachand, was traveling from Delhi to Bombay by train. During the journey, he heard from a fellow passenger that, with the war ended, the Maharaja Scindia of Gwalior was anxious to sell for Rs. 2.5 million the hospital ship S.S. *Loyalty*, which he had purchased to assist the British war effort. Alighting at the Bombay VT railway station on February 17, 1919, Walchand Hirachand headed straight for the harbor, rather

than going home first, to inspect the vessel, even though he knew nothing about ships or shipping. Impressed, but cognizant that shipping was not a matter of a single ship and would require a large capital investment, he proceeded to Narottam Morarjee, a respected textile magnate with enormous financial prowess, to discuss the venture. Narottam Morarjee agreed to support it, and the next day Walchand Hirachand met two other businessmen, and the four of them formed an initial partnership to arrange the purchase. On March 27, 1919, a company was registered with an initial share capital of Rs. 45 million, which until then was the largest amount of capital raised by any company in the market; even the Tata Iron and Steel Company had a smaller subscription.

The Shipping Triumvirate

In the trials and tribulations of the company under colonial rule, its fortunes rested on the triumvirate consisting of Walchand Hirachand, Narottam Morarjee, and Mansukhlal Atmaram Master. All three had origins in Gujarat and possessed the proverbial Gujarati acumen for business. All three were innocent of any knowledge of shipping, though they were extremely quick learners. All three were fired by patriotic zeal, though they did not overtly participate in politics. All three were born in the last quarter of the nineteenth century and grew to maturity during the rise of nationalism under the aegis of the Indian National Congress, which was founded in 1885; they identified with it and supported it financially.

The key figure in the group was, of course, Walchand Hirachand (1882–1953), a self-made man who had been very successful in the construction business in which he undertook daunting engineering projects. He was driven by a passion to make India over into an industrialized country, believing deeply that economic independence was essential to political independence. He was no believer in foreign investment and wanted industry in the country to be owned, controlled, and managed by Indians.

An entrepreneurial genius and a born manager of men, Walchand Hirachand turned into success most everything he touched. A man of action and iron will, with formidable talents, he had as his foremost characteristic “supreme self-confidence which was at once the inspiration of his followers and the despair of his adversaries” (Rao 1965: 78). In shipping, his extraordinary energy and dynamism were most of all directed to the success of Scindia, in an effort to destroy the myth cultivated by the British that India was not a seafaring nation and was incapable of running a shipping company in the modern world. He was not reticent about the

unfair practices of British shipping and of its accomplice, the colonial state, which strangled Indian shipping. Where his other business friends were inclined to caution so as not to provoke those in authority, he was outspoken, blunt, and pugnacious, and “he gave the British shipping interests few moments of peace. Sharp of tongue and quick of wit, he revelled in verbal combats with those in power and the leading lights of British business in India and raised wherever he went a storm of controversy” (Rao 1968: 79). In his educative role toward his compatriots, he held that shipping was no ordinary business but one vital for the country’s economy and security; indeed, “it was his compelling advocacy that brought the support of the political leaders of the country fully to the issue. It is to him that India owes the creation for the first time of a national shipping consciousness in the country” (Rao 1965: 78–80).

Narottam Morarjee (ca. 1877–1929) was critical to the initial survival of Scindia because of his standing in the financial community, which was essential for the mobilization of capital. Narottam Morarjee was inclined more toward caution and moderation though he was no less committed to the struggle against British hegemony in shipping. He was close to the leaders of the nationalist movement, and Gandhi was a frequent guest at his house. Mansukhlal Atmaram Master (1884–1970) was Narottam Morarjee’s loyal assistant with a law degree and a lawyer’s skills. He became the general manager of Scindia at the company’s founding. As “an energetic, patriotic and intelligent young man” (Khanolkar 1969: 185), he provided invaluable assistance to Walchand Hirachand and Narottam Morarjee. He excelled at discerning their aims, while “his unstinted devotion to both men was only equalled by his prodigious loyalty, which they in their turn rewarded with confidence, affection and trust beyond reckoning” (Khanolkar 1969: 185). Through study and application, he soon acquired mastery over the intricacies of the shipping business and emerged as the technocratic spokesman and defender of Scindia and Indian shipping. He was particularly skillful in negotiations and represented Scindia in high-level discussions and negotiations right up to Lord Inchcape in the industry and the viceroy in the government.

The War between “the Giant and the Dwarf”

With these three at the helm, Scindia swung into action even though traders and agents had been intimidated by BISN into not cooperating with it, not only in India but also along the way in Europe. On April 5, 1919, within less than ten days of the founding of the company, S.S. *Loyalty*, in a daring assertion of defiance with its own flag with a traditional

Indian symbol, sailed from Bombay for London with a group of dignitaries among its passengers, including Walchand Hirachand and Narottam Morarjee. That day has been considered a historic day in India's maritime development and, since 1964, has been celebrated annually as national maritime day. Significantly, though unrelatedly, Gandhi launched his first nationwide strike the next day after the ship sailed as part of the non-cooperation movement against colonial rule. The ship's sailing and arrival in London aroused the anger of British shipping interests; at their behest, travel agents and shippers refused to cooperate in securing passengers or cargo for the return journey. Even though this was his first visit to a Western country, Walchand Hirachand rose to the occasion. He rented another room in the hotel and turned himself into a booking agent and lined up passengers. Failing to obtain cargo enough even for ballast, he purchased 1,500 tons of iron and cement for the purpose with the intent to sell it in India.

One aim in Walchand Hirachand making the trip was to purchase more steamships for a well-rounded shipping line. Overcoming wartime statutory restrictions, he eventually was, after strenuous and persistent effort, able to buy six ships, following an understanding that he would not purchase any more British ships (Broeze 1984). While in London, Walchand Hirachand got adequate warning about the future struggle that awaited Scindia. Inchcape, the tough imperialist who presided over P&O and BISN, refused even to see him. The persistent Walchand Hirachand was finally able to get a meeting with Inchcape's deputy, Sir William Currie, who warned him: "Your intrusion into our field we consider as downright piracy. We have built up this sea transport business by years and years of infinite toil and devotion; and if you fancy that you can rob us of it by shameless bluster and a fat purse, you are grossly mistaken. The sooner you remedy your mistake, the better. Otherwise you will go the way of your predecessors" (cited in Khanolkar 1969: 73).

Persuaded by the fact that it did not have a sufficient fleet to provide a regular service in overseas trades, Scindia finally decided to operate nearer home and enter the coastal cargo trades, focusing on the India-Burma trade, with Burma then being part of India. BISN immediately threatened shippers with cancellation of their deferred rebates should they cooperate with Scindia. Meanwhile, the government denied the Scindias the opportunity to bid for transport of coal between Calcutta and Rangoon, and port authorities placed obstacles in Scindia's operations, particularly delaying the departure of its ships until after BISN's had left port (Jog 1969: 27; Khanolkar 1969: 176, 179). Several nationalist-minded shippers were defiant, but their cargo was not sufficient for the Scindia vessels. With an

intrepid management at the helm, Scindia ingeniously combined trading with shipping through establishing affiliate trading companies of its own and bought rice for transport by its ships. It carried cargo to smaller ports not frequented until then and innovatively transported sugar from Java to the west coast. When stevedoring and bunkering firms refused to service Scindia ships on BISN's prompting, Scindia started its own subsidiary for the purpose. It even brought in a Norwegian expert to develop plans for a ship repairing and building yard, though these had to be given up for the time being because of his sudden death.

Foiled in its attempt to crush Scindia, BISN then resorted to its ultimate weapon of a rate war, bringing down the rate for the Rangoon-Bombay trip from Rs. 18 per ton to Rs. 6, even though the operating cost was about Rs. 14 (India 1947: 12). Although BISN and P&O were flush with funds, Scindia had few resources to meet this onslaught. It suffered huge losses, and its capital base shrunk into half. Facing doom, Scindia was still determined to survive, and, with the country in the grip of nationalism under Gandhi's leadership, it adopted the strategy of mobilizing nationalist support. The nationalist leadership and press rallied behind it and pressed for a national mercantile marine built on the basis of reservation of India's coastal trade entirely for it. Thus, just as imperialism was critical to the domination of British shipping, so was political nationalism critical to the assertion of shipping nationalism in India and the survival of Scindia (Broeze 1984). Inchcape, who was in India at the time as chairman of the government's Retrenchment Committee, could personally see the limits that nationalism placed in his path in attempting to eliminate Scindia (Khanolkar 1969: 183).

Inchcape then resorted to a new stratagem and, in Scindia's parlous financial condition, made a tempting offer that would have been difficult to refuse — to buy out the firm. Under the offer, generous compensation was promised both to shareholders and directors. The Scindia directors, however, summarily rejected the offer, resolving that "nothing which should make the company lose its existence shall be acceptable" (Jog 1969: 32), but they agreed to open negotiations with a view to entering the relevant conference. A special meeting of 80 of the important shareholders with a majority of the shares was called to win their support for the position. At the meeting, Narottam Morarjee gave a stirring speech, reminding the shareholders that to sell the company would be "a blow to our country's prestige, with a probability of unwelcome repercussions in India's industrial life, and that our first duty is to adopt the national viewpoint" (Khanolkar 1969: 187). All except one favored the stand of the directors.

During the negotiations of the directors with Inchcape, Walchand Hirachand developed the suspicion that his colleagues may waver and get enticed into acceptance of the offer. To stiffen their spines, he let the nationalist newspaper *Bombay Chronicle* know that “all the hopes I’ve cherished up to now, are likely to go up in smoke. I shall not be able to hold up my head any more. The nation’s interests are going to be murdered.” At that, the newspaper promptly published a stinging editorial the next day warning Scindia’s directors against selling the company and asked them to contemplate “the judgement the country and posterity would pass” on them. At the next meeting, Inchcape chastised them for going public on what was to him a private business deal. The exchange that followed revealed vividly the different perspectives that the antagonists brought to the issue. Fearing that the silence of his two colleagues meant acquiescence in the accusation, Walchand Hirachand responded:

Everything is fair in love and war. You and we are now at war. In war, such tactics are necessary. In particular, when a heartless company like yours, with no thought for the rights and wrongs of it, launches murderous attacks on a newly-born Company like ours, whatever tactics we may fight you with, will be considered proper. We have nothing to regret. Since you refer to the question of clean and straightforward tactics, and decent behaviour, I must ask you — Who started the present rate war? Was it not you? As if this war, and your tactics in it, are clean and straightforward! Noble Lord! Your henchmen in the Burma rice trade affairs are trying to drive us out of there, fighting us with all sorts of tricks and harassing us in all sorts of ways. But I tell you to your face that until foreigners like your henchmen, who have come to these lands to loot the people, are driven out, I will not think twice before using not only our present tactics, but still more venomous ones. So long as you people do not give up your devilish policy of plundering and oppressing us, I shall continue to keep alight the flame of discontent which will burn you up. My aim is to leave no stone unturned to break up your imperialism in the industrial field. We can rightfully sail our own ships freely over the seas of our native land, and we will sail them. For this we do not want your grace and favour.

At this, Inchcape exploded: “Native land! Whose native land! Whose sea! We are all sons of the British Empire. We people have as much right as you, to travel along the coast of India. So long as the British Empire lasts, no power on earth can stop us coming here. The way you people are now carrying on, is the way pirates carry on. We look on the Scindia Company, which has trespassed into our maritime field, as pirates. That’s what you are — pirates!” Similar words had been uttered to Walchand Hirachand by Inchcape’s deputy in 1919 when Inchcape had not deigned

even to see him. At that time, Walchand Hirachand had been stunned by the novelty of the remarks, but now he retorted: “Who are the pirates? We — or you? Our home waters — do they belong to you people, coming from beyond the seven seas, or to us who were born and bred in this land? I see! *You* are the owners, and *we* are the thieves, the pirates! Excellent!” (Khanolkar 1969: 189–90). The session broke up, but that was not the end of the affair.

Baffled by the turn of events, Inchcape subsequently broached the subject of Scindia with a fellow member on the Retrenchment Committee, Sir Purshottamdas Thakurdas, an eminent businessman who was perceived in nationalist circles as a collaborator of the British. The latter informed him: “These men are of an intensely nationalistic type, with fiery views. They have the power to translate their views into action, and a full share of determination. What they say, they will perform” (Khanolkar 1969: 192). Purshottamdas Thakurdas nonetheless thought that they would not be unreasonable but wondered whether “you yourself will be reasonable enough to permit them to occupy their legitimate place in the Indian economy” (Khanolkar 1969: 192). At that, Inchcape shouted, “I will beat them down if they are stubborn” (Khanolkar 1969: 192), even as he had meanwhile come to realize that he now confronted men made of sterner stuff than what he had encountered earlier. Inchcape’s presence in India while the country was in the throes of nationalism, as also the colonial state’s increasing sensitivity to it, could not have been without its impact on him.

Narottam Morarjee had disapproved of what seemed to him as lack of adequate restraint in Walchand Hirachand’s behavior, at which Walchand Hirachand excused himself from future sessions. When told of that, Purshottamdas Thakurdas warned Narottam Morarjee:

It will prove dangerous to keep him out of it. You have not sized up Lord Inchcape properly. He’s a deep and crafty one. . . . [T]he opponent has to possess the same scheming brain as he’s got. In my view, the only one among you who has it, is Walchand. Inchcape is a dyed-in-the-wool imperialist, of the old generation with expansionist attitudes developed in the reign of Queen Victoria, self-centred, egotistic and individualistic. To meet the tactics of a man like that, you need a dyed-in-the-wool nationalist, like Walchand. (Khanolkar 1969: 192–94)

At the next session at Inchcape’s residence, only Walchand Hirachand spoke for Scindia in a show of unity among the directors. With Scindia struggling for survival, he then made a move remarkable for its sheer audacity — to buy out BISN. Years later, he confessed that there was

little money with which to buy BISN, but that he had behind him “the irresistible force of the growing nationalism of a country impatient and anxious to obtain its freedom. It is this unshakeable faith both in my cause and in my country that make me talk and act in a manner which the ‘live and let-live wallahs’ fail to appreciate, much less to imitate” (Khanolkar 1969: 196). Inchcape dismissed the suggestion as impertinent, and exclaimed: “Have we cherished the B.I. and raised it to such heights, in order to sell it?” To that, Walchand Hirachand responded: “In that case, my Lord, have we tenderly cherished the Scindia Company, and are we watering it with our blood, in order to sell it? When you talk of buying the Scindia Company, don’t you think you are being quite obviously impertinent to us?” (Khanolkar 1969: 196).

Both sides then recognized that they were engaged in a suicidal war. After further bargaining, they reached an agreement that Walchand Hirachand called a “slavery bond” because of its one-sided and restrictive nature but which Scindia accepted under the compulsion to survive. With that, a truce was called on March 14, 1923. Briefly, the resulting ten-year agreement, which was to last until 1933, allowed Scindia the right to carry cargo, but no passengers, along the coasts of India, Burma, and Ceylon — and only along these coasts, thus, excluding it from overseas trades. It prohibited Scindia from acquiring additional tonnage for a year beyond its existing seven steamships of a total 29,126 gross registered tons (grt). Further, it barred Scindia from exceeding a total tonnage of 75,000.

In the years following the agreement, Scindia felt victimized by the clause that excluded it from carrying passengers. More crucially, it contended that BISN continued to engage in rate cutting and employed deferred rebating to drive Scindia into ruin, even as the railways and port authorities under colonial rule favored BISN. It petitioned the colonial state and the British government and tried to mobilize the nationalist movement in favor of reservation of coastal traffic for national shipping. Although appearing to sympathize with Scindia’s plight, the colonial state refused to act to mitigate it.

Thwarted, Scindia agreed to replace the agreement with BISN by a new tripartite agreement in 1933 with BISN and its protégé Asiatic Steam Navigation Company, which only marginally improved its situation. For its part, BISN needed stability, because it could not ignore the rising nationalist sentiment for coastal reservation or, more importantly, the graver threat emerging from the increasing intrusion of Japanese shipping into India’s coastal trade. Under the new agreement, Scindia could increase its tonnage to 100,000 grt and carry passengers on two out of four India-Burma routes. The agreement still barred Scindia from India’s

external trades. Nationalism was able to prevent the extinction of Scindia but was not powerful enough yet to assure it a place on an equal footing with the British companies. The seven-year agreement provided little respite for Scindia, because it continually had to struggle for survival against the forces unleashed against it and other Indian shipping companies by BISN and its allies through deferred rebating and rate discounting.

By 1939, Scindia had pushed its tonnage to almost the maximum allowed — 98,812 grt — distributed among 23 ships, including 5 passenger ships; together with its affiliates, it controlled 120,000 grt. The entire Indian shipping at the time consisted of 132,000 grt out of a world total of 70 million grt and, after two decades of strenuous effort, had a share of 25 percent in the coastal trade and none at all in the overseas trade (India 1947: 37, 42). When World War II started, the colonial state commandeered most of Scindia's fleet while allowing much of the British fleet in India to operate commercially, as if to entrench it even further in India's trades (Jog 1969: 122). At the end of the war, because of wartime losses, the Scindia fleet stood reduced to 15 vessels with a total capacity of 69,934 grt, much of it aged and desperately in need of repairs and replacement. Unlike British shipping, there was no help from the colonial state for it.

Scindia's Linkage with Nationalism

In order to protect Scindia and other Indian shipping interests, Walchand Hirachand and his associates, particularly Master, engaged in a massive public relations campaign to cultivate nationalist leaders and to educate and mobilize public opinion. They produced innumerable pamphlets and briefing papers, newspaper articles, and book-length analyses to support their position. Their campaign was based on the fundamental premise that success in economic endeavor required political support.

In response, a galaxy of political leaders, a virtual roll call of all the heroes of the nationalist movement, ardently supported Scindia's cause. Indeed, Sardar Vallabhbhai Patel underlined the "parallel between the illuminating history of the Scindia Company and the annals of another great institution in India viz. the Indian National Congress" (Jog 1969: 1). The protective interest of the nationalist leaders in Scindia was evident in their pressing for statutory reservation of coastal trade for national shipping. Although enthusiastically supported by nationalist leadership, such legislation was thwarted repeatedly by the British bureaucracy; finally, the Government of India Act of 1935 barred any legislature in India from

enacting laws favoring Indian shipping against British shipping. As Calcutta's *Capital* had so perceptively observed, "The brutal truth is that on such an issue argument is subordinate to power" (Jog 1969: 67).

Foremost among Scindia's political backers was Gandhi, who wrote articles on the subject in his periodical *Young India*, in which he declared himself to be "an out and out protectionist" and castigated the British for building their prosperity "upon the ruin of India's commerce and industry. The cottage industry of India had to perish in order that Lancashire might flourish. The Indian shipping had to perish so that British shipping might flourish" (Jog 1965: 67). He disputed the British logic on treating coastal reservation as flag discrimination, asking: "What is equality of rights between a giant and a dwarf?" Gandhi singled out the importance of shipping among Indian industries by including it in his "eleven points" of demands on the viceroy in 1930 as a condition for cooperation with the colonial government (Jog 1965: 84).

Scindia had hitched its fortunes to the wagon of nationalism at a time when the colonial state was powerful. It was unsuccessful in getting coastal trade reserved for Indian shipping. However, its insistent campaigning and its equation of national interest with its own survival enabled it to survive when others before it had been vanquished at the hands of P&O and BISN.

Scindia's Multifaceted Legacy

As independence approached, new Indian shipping companies opened services, and, in due course, the public sector assumed a dominant role, but Scindia remained a symbol of India's determination to enter the community of maritime powers. Its major contributions lay in three areas. First and foremost, through assuring its own survival, it established the nucleus of a merchant fleet for independent India. It successfully introduced modern shipping with modern management under Indian control. Its shrewd and capable leaders, with little experience to go on, quickly acquired expertise in the intricacies of shipping to challenge the established British firms with a strong maritime tradition and managed to survive against the hostility of the British firms and that of the colonial bureaucracy. However, Scindia did more through its creation of a nucleus of a merchant fleet. It provided an example for others to follow, and, when they were threatened by British shipping interests, it rushed to their protection and threw a protective umbrella over them.

A second achievement of Scindia, beyond its vessels physically forming the nucleus of a merchant fleet, was the training of Indian talent for

maritime activity and providing it with employment opportunities within the limits of its capacity. Britishers hitherto had monopolized all positions other than ratings in India's coastal shipping. Scindia endeavored to employ Indians as officers and engineers and to explode the myth fostered by British shipping and colonial interests that Indians were neither fit nor eager to enter these positions. Scindia opened a school for training technical personnel and followed the practice of getting its foreign employees to train Indians, with a view to replacing the foreigners. Its supporters in the legislature, even though they failed to get the colonial state to agree to the reservation of the coastal trade, were able to make it bend some on assigning the *Dufferin* as a training ship for developing local talent. Later, this ship became the core of the complex of training facilities established after independence. Scindia took an active role in the governance of the training ship and provided jobs to *Dufferin* graduates. It, thus, played a major role in initiating the retraining of Indians and building maritime capabilities. In conformance with its pioneering thrust, Scindia oversaw in 1950 the first modern ship to go overseas completely officered and manned by Indians. Finally, a crowning accomplishment of Scindia's and a tribute to the vision of its founders was the establishment of the country's first modern shipyard.

SUMMARY AND CONCLUSIONS

The international regime for shipping often has been described as a liberal or market-based one. That characterization understates the element of power operative in the regime. In the first place, the present regime does not represent some natural order but comes at the end of a succession of regimes, the formation and maintenance of which have been integrally related to power. Further, power continues to manifest itself in the behavior of states in the protection and promotion of their merchant fleets. Power, thus, has been fundamental to the world shipping order and to the behavior of states in shipping.

As a phenomenon of power, imperialism in its heyday destroyed India's maritime capabilities and thwarted their development. In turn, imperialism gave birth to its nemesis, nationalism. As imperialism weakened in its conflict with nationalism, the nationalist shipping firm of Scindia seized the opportunity to survive. The countervailing power of nationalism against imperialism was paramount in the survival of Scindia. Through its multifaceted activities, Scindia then made an unenviable contribution to India's mercantile marine capabilities. Beyond that, its leaders

actively contributed to consciousness-raising among the public about the importance of a merchant fleet.

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4

“It’s All about Market Share”: Competition among U.S. West Coast Ports for Trans-Pacific Containerized Cargo

John Gulick

Over the past 25 years, the starkest trend in the collective performance of the U.S. West Coast’s ports is the dramatic growth in containerized cargo movements in and out of their jurisdictions. In 1970, 8.8 million tons of containerized cargo traveled through U.S. West Coast ports, including “intercoastal” shipments. By 1994, this figure had multiplied to 122.1 million tons (Pacific Maritime Association 1994). Not only did the gross amount of containerized cargo movements increase astronomically during this period but also each large West Coast port became more and more dependent on containerized freight as a share of its total cargo throughput. In 1989, 65.1 percent of the tonnage passing through Los Angeles and Long Beach was containerized; by 1994, 75.7 percent was containerized. Similar patterns held for the Bay Area ports (70.0 percent in 1989, 81.3 percent in 1994), for Tacoma (46.3 percent in 1989, 65.5 percent in 1994), and for Seattle (74.0 percent in 1989, 85.2 percent in 1994). In 1975, only 26.0 percent of all the cargo passing through U.S. West Coast ports was containerized. By 1994, this figure had climbed to 61.4 percent (Pacific Maritime Association 1994).

Finally, over the past 20 years, the major ports that specialize in serving container shipping lines (including their landside components) dwarf their smaller West Coast brethren by a larger factor each successive year. In 1994, those West Coast ports that the Pacific Maritime Association (PMA) classifies as “large container and mixed commodity ports”

registered roughly 4.5 times the “weighted throughput” they did in 1975. In 1994, those West Coast ports classified as “small mixed commodity ports” only registered roughly 1.5 times their “weighted throughput” gauge of 1975, and those classified as “small log/general cargo and/or bulk ports” actually did less business in 1994 than in 1975 (*PMA Update* January 1995).

The much-ballyhooed “container revolution” that began in the late 1960s, then, is far from over on the U.S. West Coast. On the one hand, the continuing boom in containerized cargo traffic in the eastern Pacific Rim can be regarded charitably as a relentless tide that is lifting the boats of all major U.S. West Coast ports, as their ever-increasing tonnage figures attest. In 1978, cargo tonnage exchanged between Asia and the United States eclipsed that exchanged between the United States and Europe (Ricklefs 1989). Through this lens, each significant West Coast container port has benefited to a greater or lesser degree from some combination of geographical good fortune and the development of the productive forces in international containerized freight shipping. In this view, every important U.S. West Coast container port shares the honor of being located at the U.S. gateway to the world economy’s foremost theater of capital accumulation, the Pacific Rim; likewise, each has been able to reap advantages offered by the diffusion of intermodal freight transportation systems, which allow cargo flowing between East Asia and the U.S. Midwest and East Coast to travel by way of West Coast sea-rail depots instead of the all-water Panama Canal voyage.

On the other hand, over the years, some of these big container ports have fared better than others in attracting shares of total coastal container throughput. This uneven growth is, at least in some untheorized measure, attributable to technological and organizational changes in international freight shipping associated with containerization and intermodalism. In the past 25 years, not only have already busy ports become much busier while medium- and small-sized ports have stagnated or dwindled, but the relative performances of the big ports themselves also have varied widely, indicating seemingly long-term trajectories of either rapid growth or slow growth. To what extent the relative performance of any singular big container port can be explained by its “fit” with the technical and market prerequisites of intermodal container shipping and to what extent relative success or failure can be traced to that port’s geographically driven trading links with specifiable regions in East Asia is a question worth exploring.

Revolutions in shipping technology and institutions and the vagaries of geography and trade are not mutually exclusive explanations for the

experience of any particular U.S. West Coast container port, nor are they the only alternatives. Drawing from the increasingly accepted notion that municipal governments (or at least their “public-private” arms) have become the “new entrepreneurs” in the global economy, one might propose that port authorities to a great degree dictate their own fate through their marketing acumen, administrative competence, and ability to broker conflicts with environmental organizations, community development activists, regulatory bodies, and landed property owners. Saskia Sassen (1994) proffers a recent representative example of the “cities as new entrepreneurs” perspective. This agency-centered view suggests that all major container port authorities are bound by the same constraints (such as the substantial bargaining power of the highly concentrated and vertically integrated container shipping lines, or the uniform wage scale, work rules, and seniority system laid out in the “coastwide contract” ratified between the PMA and the International Longshore and Warehouse Union) and distinguish themselves through their skill in managing the “built space” of port and harbor infrastructure to suit the needs of their existing or potential clients.

By no means do the technological-organizational, geographical, and trade explanations and the agency-centered explanation for the success or failure of particular container ports cancel each other out. Indeed, the agency-centered explanation is viable only if it is set in the context of technological and organizational change in the containerized freight shipping sector. It is competition between container ports for intermodal shipping traffic that places a premium on their entrepreneurial capability, technical expertise, and political know-how, and this stepped-up competition is directly traceable to the oligopolistic market power of the intermodal container carriers. For example, when a contract with an important shipping line comprises a significant percentage of a port’s container throughput and that shipping line demands access to a state-of-the-art intermodal container transfer facility to continue to charter its carriers at that port, the capacity of port authorities to anticipate and settle land-use conflicts with environmental and community advocates might prove fundamental in differentiating that port from its competitors.

One theory of why some big West Coast container ports grow quickly while others grow slowly offers more than a contribution to the social-scientific debates about structure and agency in regional development processes. Understanding the dynamics of sectoral innovation, trade patterns, and port authority initiative has practical consequences for social movements that defend marine habitats, wetlands, and neighborhoods from the ecosystem destruction, multiple forms of pollution, traffic

congestion, and land-use changes that accompany port and harbor development. If, indeed, container port performance is in some respects dependent on the entrepreneurial capabilities, the technical and legal expertise, and especially the political negotiating strategies of the port authority, social movements (through the pressures they exert on governmental agencies responsible for planning container freight infrastructure) ultimately possess power to influence the level of cargo throughput at any particular port. Relationships of conflict and cooperation among port authorities, regional transportation agencies, and natural and urban environmental social movements take on an elevated meaning if the stakes of struggle and resolution appear to be high. By initiating, or at least participating in, what I call “regional development alliances,” various of the major West Coast port authorities have demonstrated that they regard bargaining relationships with social movement organizations to be critical to their success — or at least they wish to give the impression that this is so. Forms that these “regional development alliances” have taken and do take include ad hoc coalitions spearheaded by the port authorities, involving intermodal container carriers, railway lines, elected officials, and environmental and community advocates, for the purpose of approving and implementing specific infrastructural improvements, and include permanent “participatory” instruments that incorporate the input of port authority technocrats, environmental organizations, and public user groups into the regional transport planning apparatus.

A standing hypothesis, then, is that regional development alliances do condition the competitiveness of a container port. Testing this hypothesis requires critical social-scientific inquiry into recent trends in trans-Pacific trade, the technological and organizational character of both the container and the intermodal “revolutions” in the freight shipping sector, the pressures and flexibilities these phenomena have afforded container port authorities, and the complicated relationships between these three things. An example of such a key interrelationship would be the dynamic between more efficient, timely, and reliable movement of containerized cargo, on the one hand, and the increasing levels of merchandise imports from and exports to East Asia as a percentage of U.S. gross domestic product, on the other (Branch 1988; Kagan 1990). One important distinction raised earlier in this chapter that must be kept in mind throughout this investigation is that between the composite experience of the major U.S. West Coast container ports — continually rising volumes of containerized trade, increasing specialization in serving container carriers, and widening dominance over lesser ports — and their individual histories relative to one another. In this spirit, I will proceed by tracking the dry cargo

import-export performance of five of the U.S. West Coast's major container ports (Long Beach, Los Angeles, Oakland, Seattle, and Tacoma) over the past ten years, paying particular attention not to raw volume or value figures but to share of raw volume and value figures.

After I review comparative container port performance, I will make some very brief remarks about merchandise trade patterns that have connected and continue to connect the U.S. West Coast with East Asia. I will offer a few strictly hypothetical propositions about which container ports maintain the tightest links between particular East Asian countries and regions, in the way of developing a more complete theory about the relative growth of U.S. West Coast trade entrepôts. I then will consider the most significant technological and organizational changes in the international seagoing freight sector of the past 20 years — containerization, intermodalism, “pivot” or “hub” ports, double-stack trains, the Electronic Data Interchange, and so on — and comment on their implications for emerging patterns of how containerized cargo is geographically distributed among the big U.S. West Coast ports. Finally, I will sketch a framework for understanding the entity that is at the core of the “cities as entrepreneurs” explanation for port authority performance — the aforementioned regional development alliances composed of shipping lines, port officials, transportation planners, municipal delegates, and social movement representatives. I will stress changes in federal transportation policy (inaugurated by the passage of the Intermodal Surface Transportation Efficiency Act of 1991) that devolve planning and funding decisions, including those concerning intermodal freight infrastructure, to local and regional institutions and formally enlist the participation of environmental and community-based organizations.

COMPARATIVE BIG CONTAINER PORT PERFORMANCE AND TRANS-PACIFIC TRADE

Monthly and annual data gathered by the Bureau of the Census, Foreign Trade Division, and the PMA, a consortium of large shipping and stevedoring companies, indicate several telling trends about the comparative cargo export and import performances of the major U.S. West Coast ports. How have the five largest container ports fared in the cargo export wars with respect to one another over time? The Bureau of the Census data report that Long Beach and Los Angeles together seem to have increased their share of the “Big Five” export total to the point where, in the first three quarters of 1995, the ports of Long Beach and Los Angeles

claimed almost three-fifths of the total value of containerized cargo exported from the Big Five ports (Table 4.1). The impressiveness of Long Beach's and Los Angeles' dominance in the U.S. West Coast cargo export trade is made all the more impressive when one considers that, in 1993, only 38.0 percent of Long Beach's and 36.8 percent of Los Angeles' container cargo volume was loaded, as opposed to discharged (Pacific Maritime Association 1994). Oakland appears to have recovered somewhat from the beating it took in the late 1980s when Long Beach–Los Angeles in tandem and Tacoma stole a good deal of its relative share of dry cargo exports. More than any of the other Big Five ports, Oakland specializes in servicing container shipping lines (in 1995, 95.6 percent of the total volume of its cargo throughput was containerized), especially containerized exports (in 1993, 64.6 percent of its container cargo volume was loaded, as opposed to discharged). Long Beach–Los Angeles' regional gain in export shipping seems to have come to Seattle-Tacoma's detriment in the period investigated, with the consequence of more furious competition between Seattle and Tacoma for a diminishing relative share of West Coast dry and containerized cargo exports. Tacoma was a real "comer" in the span 1986–88, but it has been all downhill since (12.2 percent of all Big Five dry cargo export value in 1988, 9.0 percent in 1993). Unsurprisingly, the fates of Seattle and Tacoma seem to be in an inverse relationship, as Seattle's impressive gains in total West Coast dry cargo export share since 1993 have mirrored Tacoma's losses.

The Bureau of the Census import data tell a somewhat different story than the export data, illustrating, of course, the degree to which a specific port is a loading port or a discharge port. Long Beach–Los Angeles in tandem claimed an even greater share of Big Five dry cargo and containerized imports than exports, although this combined measure stayed more or less even over the years, instead of rising. In 1986, it stood at 64.0 percent in dollar value terms and in 1995, at 65.2 percent. Long Beach closed

TABLE 4.1
Regional Shares of Big Five Dry Cargo
Export Total (Value Terms)

	1986	1988	1991	1992	1993	1995
Los Angeles–Long Beach	48.7	53.7	57.0	56.6	55.4	59.2
Oakland	22.2	19.6	19.3	22.2	23.4	19.9
Seattle-Tacoma	29.0	27.2	23.7	21.2	21.1	20.9

Los Angeles' longstanding lead as a dry cargo importer to the point of negligence — in fact, in the first three quarters of 1995, 33.3 percent of containerized cargo (in dollar value terms) discharged at a Big Five port was unloaded at Long Beach, whereas the mark stood at 31.9 percent for Los Angeles. Oakland improved its import performance in both volume and dollar value terms from a low ebb in 1991. In 1991, 9.0 percent (in dollar value terms) of all dry cargo unloaded at a Big Five port was imported through Oakland; the monthly data from 1994 suggest that that figure had risen to an average of about 11.0 percent, a figure backed up by the 1995 data for containerized cargo imports. Again, the share of Big Five dry cargo imports claimed by either Seattle or Tacoma stand in inverse relationship to one another over the 1986–95 period, although not in the context of general regional decline, as with dry cargo exports. Tacoma gained dry cargo import share during the period 1986–92 while Seattle lost it; in the period 1993–95, the trend reversed. In dollar value terms, in 1995, Seattle claimed 14.4 percent of the Big Five's total of containerized imports; Tacoma, 9.5 percent. A final notable contrast between the data documenting individual port export shares versus individual port import shares is that figures for the former fluctuated much more sharply from year to year than did the latter. I will not hazard a guess as to why this is so, except to comment that the risks for individual port authorities to gear physical improvements and construct political coalitions around dry cargo exports seem high, and the "credibility costs" absorbed by various community-based and environmental organizations who participate in cooperation schemes with port and regional transportation planning officials may be even higher.

The PMA figures on the combined import-export performance of individual West Coast ports over the past 20 years tend to verify the accuracy of the Bureau of the Census-based findings of individual port shares of both dry cargo exports and imports. The key trends are all confirmed: the accelerating dominance of Long Beach–Los Angeles and the "move" by Tacoma during the mid-to-late-1980s, which has since abated to the benefit of Seattle (*PMA Update* January 1995). Another highly relevant piece of information that emerges from the PMA data is confirmation of the import orientation of Long Beach–Los Angeles cargo shipping operations and the export orientation of Oakland's (*PMA Update* December 1995). The PMA data covering the period January–October 1995 show that the major ports claimed the following shares of total West Coast containerized throughput: Long Beach, 30.1 percent; Los Angeles, 27.4 percent; Oakland, 14.8 percent; Seattle, 14.0 percent; Tacoma, 10.0 percent. (*U.S. Waterborne Exports and General Imports* 1986–95).

At the outset of this chapter, I documented three overarching trends in U.S. West Coast containerized cargo throughput: enormous and continuous growth in composite containerized cargo throughput, increasing concentration of container carrier service in the well-established, major ports, and increasing reliance of these major ports on servicing container carriers to earn their revenues. From a world-systems point of view, one might expect that the first trend would not obtain during a "B-phase" in the world economy characterized by alternating slow growth and stagnation. One might anticipate, instead, concomitant with intensified interstate competition, the formation of supranational blocs that regionalize trade foreign direct and portfolio investment and stifle trans-Pacific commodity flows. However, astute political economists in both the 1980s and the 1990s have noted that, since the slowdown in world economic growth in the 1970s, one facet of the restructuring of world economic geography has been the rapid expansion of foreign trade (including, of course, the shipment of merchandise goods across national frontiers) relative to growth of world production (Harris 1991; O'Connor 1996). Improvements in the efficiency, timeliness, reliability, and safety of container freight transport brought on by sectoral innovations have played no small role in this globalization dynamic (Grey 1991; Harris 1991; Harvey 1996).

Certainly, a superficial glance at the evidence points to the evolution of a distinctly East Asian production and trade regime, led by outsourcing Japanese and newly industrializing countries' transnational corporations and followed by dependent suppliers in Southeast Asia (Leger 1995). Without scrutinizing the data, it seems generally true for all East Asian countries that each country is sending a greater share of its exports to other East Asian countries and taking in a greater share of its imports from other East Asian countries. One might tentatively explain away the phenomenon of ever-increasing cargo flows on the U.S. West Coast by simply pointing to the fact that the western Pacific Rim has emerged as the world economy's foremost theater of capital accumulation and that, whatever the tendencies toward East Asian bloc formation, the U.S. West Coast (part of the eastern Pacific Rim) in effect serves as the Western Hemisphere's entrepôt to this enormously dynamic region. It is undeniably well-known that East Asian consumer good markets are not yet either wide or deep enough to absorb all consumer goods manufactured and assembled in East Asia and that economic growth in certain, if not all, East Asian countries is still very dependent on exporting consumer goods surpluses to the United States, as well as importing capital goods from the United States. This goes a long way toward explaining the continuous expansion of U.S. West Coast port activity: the largest U.S. ports (and

largest container ports) are Long Beach and Los Angeles, which have grown astronomically in the past 25 years and specialize in bringing in East Asian goods, as their effete export-import ratios attest.

With reference to transnational trade flows in the world economy, there is a fairly straightforward, however partial, explanation for the overarching trend of Long Beach–Los Angeles “stealing” Seattle-Tacoma’s share of the U.S. West Coast’s dry and containerized cargo exports. According to the Bureau of the Census data, in the period 1988–93, Southeast Asia (including Malaysia and Indonesia) received an increasing share of all U.S. containerized cargo exports bound for East Asia. One can imagine some fairly obvious reasons for this: the bursting of the Japanese “bubble economy,” uninterrupted expansion of growth rates in most Southeast Asian countries during this period, and U.S. capital goods exports to facilitate the “sourcing” strategies of U.S., Japanese, and even some newly industrializing countries’ transnational corporations in the Southeast Asian region. The South Pacific U.S. coastal district (including mainly Long Beach–Los Angeles and Oakland) has always had a foothold on U.S. containerized cargo exports to Southeast Asia and actually has managed to increase its percentage of the national total in the period 1986–93, as well as improve upon its ratio of domination over the North Pacific U.S. coastal district (including mainly Seattle and Tacoma) (Table 4.2).

TABLE 4.2

South Pacific (Los Angeles–Long Beach–Oakland [SP] versus North Pacific (Seattle-Tacoma [NP] Containerized Exports to Eastern Asian Regions, in Weight Terms, as a Percentage of Overall U.S. Containerized Imports from Eastern Asia

	1986	1988	1991	1992	1993
To Northeastern Asia					
SP	41.9	46.0	46.9	45.2	44.3
NP	37.8	32.1	33.2	35.7	35.4
To Southeastern Asia					
SP	38.2	46.1	49.1	52.2	51.3
NP	23.8	20.9	22.3	21.1	22.0
To Indonesia-Malaysia					
SP	37.7	53.2	51.5	45.1	42.4
NP	10.7	11.4	11.4	12.8	15.4

The raw amount of U.S. containerized cargo exports to Northeast Asia is, of course, also growing over the same period (although not at the same rate), and here, too, the South Pacific has widened its once-narrow lead over the North Pacific for capturing share of total U.S. volume.

This explanation for the rise of the South Pacific coastal district is partial because it implies that the ports of Long Beach and Los Angeles have fared well vis-à-vis the ports of the Pacific Northwest by virtue of their historic trading connection with and geographical proximity to Southeast Asia, a region that now “happens” to be one of the most dynamic centers of world economic growth. This explanation does not account for why it is that the South Pacific coastal district’s share of total U.S. containerized cargo exports to Southeast Asia is growing faster than that of the North Pacific coastal district, which boils down to a complex of interrelated causes and effects: what types of containerized commodities Southeast Asian countries are importing from the United States and which West Coast ports these types of commodities tend to move through, the routing strategies of cargo liners and overland carriers, the infrastructure and service advantages that one port has secured over another, and so on.

Since 1986, there have been no dramatic shifts in the share of containerized exports to the U.S. claimed by each subregion of East Asia (Table 4.3). Since 1988, Southeast Asia has exported more containerized

TABLE 4.3
South Pacific (Los Angeles–Long Beach–Oakland [SP] versus North Pacific (Seattle-Tacoma [NP] Containerized Imports from Eastern Asian Regions, in Weight Terms, as a Percentage of Overall U.S. Containerized Exports to Eastern Asia

	1986	1988	1991	1992	1993
From Northeastern Asia					
SP	51.9	49.8	55.4	57.5	58.7
NP	19.8	25.7	26.9	26.0	25.2
From Southeastern Asia					
SP	56.4	60.4	63.2	62.9	63.3
NP	16.2	14.1	14.6	14.7	14.3
From Indonesia-Malaysia					
SP	26.8	39.8	54.8	58.8	51.3
NP	13.4	29.0	15.9	13.0	18.1

cargo to the United States than has Northeast Asia. Over the period 1986–93, both the North Pacific and the South Pacific coastal districts increased their shares as points of entry for containerized cargo exported from Northeast Asia to the United States, the South Pacific besting the North Pacific's share by better than 2:1 throughout. The South Pacific coastal district has consolidated its massive lead over the North Pacific as a point of entry for containerized cargo exported from Southeast Asia. The domination of the South Pacific coastal district, most especially Long Beach and Los Angeles, as a point of entry for East Asian containerized cargo, most especially Southeast Asian containerized cargo, should come as no great surprise. Seagoing transit times from Southeast Asia, the size of the Los Angeles metropolitan consumer market, and intermodal access to the Southwestern, Midwestern, and Eastern United States all ensure the ports of Long Beach–Los Angeles' prominence as U.S. points of entry for the light industrial goods assembled and increasingly manufactured in Southeast Asia. However, Southeast Asian manufacturers are beginning to send containerized goods destined for U.S. markets by means of the Suez Canal and the Mediterranean (Ricklefs 1989). The fact that containerized exports bound from Southeast Asia to, say, Orange County, California, may increasingly travel by way of a U.S. "land bridge" starting on the East Coast proves that intermodalism does not categorically discriminate in favor of the West Coast ports.

A more contingent rationale for the impressive gains in U.S. West Coast port activity rests with technological and organizational change in the shipping sector. The "intermodal" carriage of cargo containers on double-stack trains allows East Asian containerized exports destined for Chicago, New York, Texas, and so on to bypass the Panama Canal and travel by way of sea-rail links anchored at or near U.S. West Coast port facilities. I will briefly touch on the role that technological and organizational innovation in the international freight sector plays in redistributing port activity within the United States in the next section. I introduce the subject here only because it seems plausible, indeed necessary, to assert that the "outcome" of the U.S. West Coast port boom can be explicated even given the world economic slowdown of the past 25 years and gradual trends toward the relative regionalization of the East Asian economy. It is also worth remembering the dialectical premise that the refashioning of productive forces and social relations in the container transport sector has been stimulated by the world economic slowdown and the concomitant processes of economic and spatial restructuring. The transport sector is a productive force for capital because it reduces turnover times, and it naturally follows that transport sector innovation (especially that

involving the efficient physical movement of constant, as opposed to variable, capital) intensifies during moments of economic slowdown or crisis. Stephen Bunker and Paul Ciccantell (1995) make the somewhat related points that "transport does not transform the raw material but it does greatly increase its use value, or its contribution to the productivity of labor. . . . In this sense Harvey (1983) is quite correct to call transport a process of production. . . . Once we define transport as a form of production, the distinction between mercantile and industrial capitalism becomes far less clear."

TECHNOLOGICAL AND ORGANIZATIONAL INNOVATIONS IN OCEAN-GOING FREIGHT

The latest ensemble of containerized freight shipping innovations primarily revolves around landside infrastructures and organizational networks. The complementary elements of this new ensemble include huge post-Panamax container vessels (vessels too large to pass through the Panama Canal), dockside rail spurs, container transfer facilities, double-stack trains, the Electronic Data Interchange (EDI), and consulting firms specializing in shipping system management. Intermodality can be defined most simply as door-to-door container delivery (i.e., the door of the factory or the distributor in the sending country to the door of the consignee) provided by a singular carrier integrated physically by way of ocean liner shipping, gantry crane loading and unloading, yard equipment handling, tractor-trailer drayage, warehouse storage, and railcar movement and organizationally by vertically integrated firms or partnerships coordinated by advanced communication frameworks. Intermodality modifies the function of a port. Ports are no longer the endpoint of a seagoing journey where containers are opened and bulks redistributed but, instead, are stations for the hyperefficient steering of container flows.

In some respects, intermodalism is a byproduct of the rationalization that occurred in the oceangoing shipping sector between the recession-plagued years of the late 1970s and the mid-1980s. During this time of "shake-out" in the heavily overbuilt container carrier trade, many firms went by the wayside, spurring an interplay between growing concentration of shipping line ownership; increasing vertical integration between sea, land, and logistical operations; and heightened technological and organizational innovation (Fossey 1990; Gilpin 1983). Pressures mounted on nearly insolvent shipping lines to shift the burden of risky investments onto the port authorities. For example, liners no longer came equipped with their own container handling cranes; instead, port authorities had to

invest in these very expensive capital goods, often leasing their usage to a particular carrier over the duration of a long-term contract (Grey 1991).

Concentration of ownership and vertical integration of operations, manifested by the rapid rise of intermodal companies, was not strictly a consequence of economic and sectoral crisis alone. The U.S. state played a pertinent role through a series of deregulatory interventions in the shipping sector. Critical pieces of legislation include rail and truck deregulation of the early Reagan years, which allowed railroads to offer long-haul, high-volume discounts to potential double-stack container carriers and truckers to charge on bases other than mileage, permitting some truckers to specialize in short-haul drayage services (Kagan 1990). The Shipping Act of 1984 allowed shipping firms to peg rates according to the delivery costs of integrated door-to-door service and allowed the mergers and partnerships between railway, rail car, ocean shipping, trucking, and container terminal concerns that made door-to-door service logistically feasible (Hayuth 1991; Kagan 1990).

The main advantages of saving transit time and monitoring flow logistics accrue only if wheeled containers can be shunted directly onto a rail car, preferably close to the unloading dock so that truck drayage can be averted. The extreme and seemingly irreconcilable traffic congestion on roads in and around port and harbor complexes makes truck drayage highly undesirable, as does the increasingly erratic labor discipline of truckers, who have reacted to the supercompetitive atmosphere unleashed by North American Free Trade Agreement and intrastate trucking deregulation with strikes and other job actions (Butzbaugh 1996). After containers have been processed through customs and sorted at container terminals, shipment to "forelands" and markets beyond increasingly go by way of double-stack trains, that is, tailor-made rail cars that stack one container upon the other. Double-stack trains allow "double the value" to be carried on a singular train and efficiently concentrate cargo consignment to distant inland markets on a few primary rail circuits (Hayuth 1991). Moreover, containers are lighter than traditional boxcars, so double-stack trains consume less fuel per mile (and much less per unit value carried per mile) and cut down on railway wear and tear, which is of increasing importance to shipping lines themselves as they vertically integrate with companies owning or holding controlling shares of railroad stock (Kagan 1991).

The EDI is the key to tying together all facets of cargo movement through an intermodal system, and shipping firms make their access to this informational network a selling point to manufacturers, distributors, and consignees who plan production, marketing, inventory, and sales according to "just-in-time" schemes. Just as the carriers tantalize their

customers with EDI access, the port authorities must grab the attention of shipping lines by touting their own networking capabilities, and informational logistics becomes a new domain of interport competition (Bowen 1989; Hayuth 1991). The EDI is yet another example of how shipping innovation both drives (as a "productive force") and is driven by the competitive cauldron of global production systems.

Of all the facets of the ensemble of new innovations, it is the "pivot port" or "hub port" concept (and reality) that most centrally undermines the port authorities' control vis-à-vis the big carriers. The evolution of containerization and supersize vessels segregated ports of call into a hierarchy of principal and secondary ports. The contemporary evolution of intermodal transit tends to funnel cargo to ports with rapid access to double-stack train lines that serve major inland markets, setting off a new round of centralization. Large shipping lines make fewer ports their ports of call, and smaller ports no longer can assume that they will channel exports from their long-established hinterlands (Ricklefs 1989; Kagan 1990). The large shipping lines increasingly choose not to call at even the more sizable ports if these ports are principally export oriented, because this would require that the shipping line pay a visit with a partially empty vessel, in the process forgoing other cargo-carrying opportunities and eating up precious funds in operating expenses (Ricklefs 1989). Even the competition between principal ports is stepped up as highly concentrated firms demand the latest, swiftest load and transfer technology, sufficient berthing and storage space, and speedy access to railheads. In an ironic twist, container port competitiveness is now geared more around the land-side market connections established by its major carriers and less around its purely "internal affairs," that is, remaking the natural and built environments under its command to optimize the cheap and timely movement of cargo (Hayuth 1991). Forty-five-foot deep channels and computerized customs clearance are considered baseline standards of port success, while a port's coordinates in an abstract, Newtonian grid of container movements devised by the intermodal firms seems to drive its fate (Ricklefs 1989).

Nonetheless, shipping companies demand particular quantities and qualities of built space. They may not commit to serving a port unless assured that the port authority has the capacity to modify or build new transport and storage infrastructure, which means unutilized land or the financial and legal means to acquire new, adjacent land. Depending on the overall mix of cargo throughput and service provision, an intermodal firm may prefer that the port authority build a container transfer facility for common use, that it build such a facility and lease it to the firm, or that it

arrange a long-term land lease with the firm and allow the firm to build a private facility. Intermodal firms that carry fluctuating levels of cargo through a port often prefer their own dedicated facilities to avoid possible bottlenecks in public loading and transfer facilities and make up for periods of underutilized productive capacity by guaranteeing consignees rapid and reliable service. Port authorities must take care to make the actual use values of built space conform to their potential exchange values. Dockside space must be augmented (through dredging new channels or building new service islands) or cleared to maximize the physical concentration of loading and unloading equipment; partitioning, storage, and other functions now connectible to dockside activity by rail must be apportioned to back lot space. At the same time, sorting and storage space cannot be located too far from the berths and cranes, because then too much energy, labor, and time are devoted to moving containers from the docks to the back lots (Hayuth 1991).

PORT FAILURE AND SUCCESS AND "REGIONAL DEVELOPMENT ALLIANCES"

As I have tried to suggest, the success and failure of individual U.S. West Coast ports in attracting cargo liners and intermodal shipping company investment and in raising shares of total West Coast containerized cargo throughput has at least something to do with factors beyond the port authority's control: the ways in which the "intermodal revolution" redirects freight traffic, the ebbs and flows of trade with specific subregions in East Asia, the rise and fall of foreign demand for specific commodities that tend to be exported from a particular region or locale (e.g., grains and Portland), the immutable fortunes and misfortunes of geographical proximity and distance, and so on. It is also quite clear, however, that the ports engage in a ferocious competition, both intraregionally (Seattle versus Tacoma, Los Angeles versus Long Beach) and interregionally (Seattle-Tacoma versus the San Francisco Bay area versus Southern California), especially for the highly standardized "discretionary cargo" arriving in containerized form and bound for markets east of the Rockies (Bowen 1989). Competition for containerized freight imports has a way of compounding competition for leading status as an export port: because carriers operating post-Panamax vessels make fewer ports of call, they prefer to discharge payloads at ports where they can do a roughly parallel business in loading as well. Port authority competition certainly is spurred not only by the growing usage of huge cargo liners that optimize economies of scale but also by the growing size and concentration among

the globally oriented cargo liner companies themselves, a tendency that embraces vertical integration between modes (i.e., owning and operating cargo liners, gantry cranes, and other yard equipment, inland transfer terminals, containers, double-stack rail cars, and even partial or controlling shares of stock in rail lines).

Even though the raw figures for containerized cargo throughput continue to scale upward for almost every major port almost every year, the ports find themselves in a tricky bind when it comes to positioning themselves to capture increasing shares of total coastal cargo flow. From the port authority official's point of view, market share of total coastal cargo throughput is the unparalleled measure of success or failure, for several reasons. First, when total coastal cargo throughput is growing so rapidly, a container port usually is not regarded as competitive simply when it records increasing volumes and values of cargo movements but only when it defends or extends market share. Second, when medium- and small-sized ports drop out of the intermodal container contest, this only puts more intense competitive pressure on the major container ports to pick up the slack. Third, at the root of the significance of share as a barometer of performance is the fact that ports can stay in the container game only as long as they can put up large capital outlays for conducting environmental assessments, hiring lawyers, building man-made islands with dredged fill, purchasing land, constructing berths and terminals, and so on. Because they are chartered public-private corporations that depend on land leases, facility user fees, a portion of customs duties, and bond sales to balance their books, U.S. port authorities are caught in a vicious circle of needing a customer base to finance the improvements necessary to keep that customer base and, thus, are obsessed with market share, like most any other large corporation (Ricklefs 1989). Senior executives at port authorities certainly recognize the importance of attracting continuously increasing throughput in order to maintain and increase cargo shares. According to Jim Putz, acting intermodal manager for the port of Oakland (in 1989), "Any port can and should tap local cargo to serve its local population . . . (but) if a port wants to maximize its revenues, it must supply intermodal capabilities . . . in this day and age, a port has to be pro-active. *The name of the game is market share*" (Bowen 1989, p. 17; emphasis added).

Despite port officials' rhetorical insistence that the marketing tactics and investment decisions of their "team" determines their success or failure, various rigidities beyond their control partially deal out the fate of their port, and their slipping bargaining position with the intermodal carriers compromises their flexibility. This puts more pressure on port

authorities to decisively steer those factors that remain under their control: their relationships of conflict and cooperation with local and regional planning agencies, municipal and county governments, and environmental and community advocacy organizations (Ricklefs 1989). I have put together a diagram (Figure 4.1) that I think best illustrates the various “players” that assemble in and around a containerized cargo port and through their interplay condition whether a port is successful in inviting cargo liners and other intermodal shipping interests to charter vessels, rent berths and yard space, build or rent terminal facilities, and so on. The figure features three principal categories of groups: the shipping lines and other intermodal shipping parties; the port authorities themselves,

FIGURE 4.1
Actors Conditioning Fixed Capital Investment into Ports



accompanied by other regional planning agencies — regional transportation agencies, in the main — who have some stake in fostering regional economic development and enhancing an area's prospects for fixed capital investment; and the panoply of regional and local social movement organizations whom I call the "defenders of the conditions of production," that is, representatives of those segments of the urban area's population that object to the way port and harbor expansion and associated landside "improvements" degrade regional and local natural and built environments and displace the ecological and economic costs of growth onto the urban area's most politically marginal citizens and environmentally sensitive habitats.

The diagram implies the following relationships. One, the shipping lines and other containerized cargo carriers have significantly augmented their bargaining power vis-à-vis the port authorities. Port authorities must turn to environmental organizations and community-based organizations that can delay or derail their aquatic sediment dredging and dumping, land acquisition, and road and rail extension plans for help. In terms of organizing the plans and galvanizing the funds for constructing the whole host of "landside access" improvements necessary to keep a port competitive, among metropolitan bureaucracies regional transportation agencies may play as or more important a role than the port authorities themselves. Especially if they operate under the mandate of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA), regional transportation planning agencies, too, are compelled to turn to locally-oriented environmental and community-based organizations for input and legitimacy, if not officially binding decision-making power.

The passage of ISTEA by Congress in 1991 devolved a great deal of authority over regional surface transportation improvement to metropolitan planning organizations (MPOs), from developing proposals, to raising funds, to implementing projects. Under ISTEA, MPOs become vested with two major areas of responsibility in the realm of regional transportation infrastructure: mass transit and, pivotally for the competitiveness of specific ports, intermodal freight shipping (National Commission on Intermodal Transportation 1994). The composition and objectives of MPOs, which differ by locality, will go a long way in determining whether the sorts of alliances and relationships are developed between shipping interests, planners, political officials, and social movement delegates that cater to efficient and predictable transport of containerized freight. Given the twin mandates of the MPOs, one might conceive of a tension between moving people (i.e., providing regionally integrated and multimodal mass transit that is low cost and broadly accessible) and

moving freight (i.e., ensuring that traffic congestion does not ensnare the safe and timely movement of containerized freight and that there exist regionally an adequate supply of intermodal freight connectors — dock-side rail, container transfer terminals, dedicated freight corridors, and so on).

Included under the rubric of ISTEA are mechanisms to incorporate the participation and input of environmental and community-based organizations in MPO procedures, again in line with ISTEA's philosophy that regional transportation improvements must be tied in with "environmental and socioeconomic concerns" (National Commission on Intermodal Transportation 1994). To the extent that my early research indicates, the collaborative panels that have been set up deal almost strictly with issues of designing innovative mechanisms for financing mass transit projects, establishing schedules and routes that coordinate the services of various mass transit modes, controlling vehicle emissions, and so on — not at all with containerized freight shipping. There do, indeed, exist committees within MPOs to address regional transportation infrastructure improvements amenable to container freight shipping interests, but they are not truly "collaborative" at all. In the nine-county San Francisco Bay Area's MPO (the Metropolitan Transportation Commission), there exists a little-known entity called the Freight Advisory Council (FAC) whose meetings are public but whose voting membership is restricted to top executives from the Bay Area's railroads, seaports and airports, trucking and shipping firms, delivery services, air cargo companies, intermodal freight brokers, and retail and manufacturing sectors. One of the FAC's current lobbying measures is to convince the state legislature to slough off the funding and planning of state "arterial" roads onto counties and localities, so that the state department of transportation can focus its financial and human resources on roads that carry long-distance freight or roads that connect port and harbor terminals to inland container transfer facilities (Mattson 1996). Another example of such an entity would be the Freight Task Force, a pressure group composed of carriers, shippers, and receivers lodged within the Delaware Valley (Pennsylvania) MPO.

One might deign to conclude that one function of MPOs is to reconcile local land use planning conflicts and to steer transportation infrastructure investment to service the world market competitiveness of the urban area in question. This would match the federal Department of Transportation's changing justification for funding transportation infrastructure improvements, which has metamorphosed from making worker commuting less expensive and more environmentally friendly (i.e., lowering the costs of reproducing labor power and easing the stress on the natural "conditions

of production”) to boosting U.S. merchandise exports by making the shipment of containerized freight quicker and more reliable. Certainly the work of panels such as the FAC will have repercussions for the export-import competitiveness of specific container ports, whether they are negative (because the exclusivity of such panels engenders conflict from environmentalists and neighborhood activists) or positive (because they “get the job done for freight”).

CONCLUSION

The past 25 years have been full of contradictions for the U.S. West Coast’s big container ports. Riding on the crest of booming trans-Pacific trade and abetted by the “creative destruction” of the intermodal freight transport “revolution,” ton equivalent unit counts at all of the big ports have swollen mightily. At the same time, larger ton equivalent unit counts mask the degree to which the big container ports have become subordinated to the decisions of the transnational container carriers, highly vertically integrated operations that are now embarking on new rounds of cooperative “cargo sharing agreements.” Competition between the big container ports for the services and investments of the intermodal carriers has reached a fever pitch. It is a curious type of competition, because the immediate diffusion of the latest standardized cargo load, transfer, and transport technology minimizes the advantages any one port has to offer over another. A port authority must offer a transnational container carrier 45-foot deep channels and berths, ample harbor space to maneuver huge ships, super-fast gantry cranes, sufficient yard space, dockside rail, high-technology customs clearance, an inland container transfer facility, and the administrative and technical wherewithal to pull it all off — yet these “inputs” alone are no guarantee of success.

Amazing though it may seem, experts agree that there is an oversupply of intermodal container freight infrastructure located in and around the developed world’s ports (Kagan 1990; *PMA Update* June 1995; Ricklefs 1989). Harbor, terminal, rail, and road congestion may be a problem for the shipping lines and their customers at particular times and places, but this is largely an artifact of uncoordinated route scheduling, a byproduct of the anarchy of the market in capitalist freight transport. This condition of oversupply at a broad sectoral level not only mirrors the fact that some big ports have fared better than others in this new era but also is an ingredient of increased competition itself, as ports desperately try to make good on their sunk investments by tendering sweeter and sweeter deals to the intermodal carriers. Obligated to pay off bondholders and other creditors,

pinched by declining federal support for dredging and other maintenance operations, and faced with the uncertainties of cargo liner business, it is no mystery why many port authorities diversify their assets by going into real estate development and speculation (Pisani 1989).

Although it might take a very active moral imagination to think of public-private corporations such as ports as victims —especially the visibly successful ports such as Long Beach and Los Angeles — their structural situation vis-à-vis the container carriers in many respects encapsulates the victorious offensive that transnational capital has waged against the rest of world society so intensely for the past 15 years. About 10 years ago, the large intermodal freight companies emerged from a long period of low capacity utilization, crippling debt, and bankruptcy more concentrated and integrated than before, yet more flexible as well. Essentially, they learned how to pass on the costs of operating in a risky environment to the port authorities. My contention is that the port authority-led “regional development alliances” must be viewed as more benign-seeming mechanisms for the port authorities to do to environmental and community-based organizations what the transnational shipping lines have done to them.

If port authorities, powerless to control intermodal container transport innovations, geographical location, or merchandise trade flows, resort to these alliances precisely because they represent one domain where they have some maneuverability, what does this say about what defenders of the natural and built environment stand to gain or lose from entering these alliances? Do these alliances that the port authorities either spearhead or have exigent cause in which to participate (such as the various committees contained in regional transportation agencies) make a significant difference when it comes to attracting or deterring containerized export and import traffic in a given port? Even if they do not, do they at least serve a useful political function for the port authorities by fostering the impression of bottom-up participation in infrastructural improvement decisions of noteworthy local consequence? If alliances yield a rehabilitated wetland here or a container freight corridor rerouted away from a poor residential neighborhood there, do the ulterior motives of the port authorities and regional transport agencies impugn outcomes amenable to social movement organizations, suggesting cooptation? These are some of the most telling questions that animate my research, the answers to which will become more evident from studying the structure, content, and outcomes of the regional development alliance processes that have been set up on a metropolitan basis. The jury is still out as to whether regional development alliances make a serious difference in attracting container cargo

traffic to a port, but the fact of the matter is that they exist and have become part of the formula by which the embattled U.S. West Coast port authorities try to distinguish themselves from the rest of the pack. Economic geography and comparative political sociology can tell us what roles trade, transport innovation, location, and port authority entrepreneurialism play in the trajectory of a container port, but only a combination of political economy and critical theory can tell us whether an environmental or community advocacy group should or should not cooperate with port authorities and regional transportation agencies in the name of sustainable regional development.

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5

The Hazardous Waste Stream in the World-System

R. Scott Frey

The history of risk distribution shows that, like wealth, risks adhere to the class pattern, only inversely: wealth accumulates at the top, risks at the bottom.

— Ulrich Beck (1992: 35)

Wealth (in the form of raw materials and energy) flows from the resource-rich countries of the periphery to the industrialized countries of the core (Caldwell 1977). This resource stream (commodity chain [Gereffi & Korzeniewicz 1994] or dissipative structure [Clark 1996], as some prefer to call it) has become the subject of increased interest to world-system scholars. They have focused attention on the political-economic forces, physical principles, and consequences underlying resource extraction from the periphery and transport to the core for industrial production (e.g., Bunker 1985, 1994; Bunker & Ciccantell 1995). As yet, however, little attention has been directed to the end product of this process: the disposal of the antiwealth (or hazardous wastes¹) produced in the core. Core wastes must go somewhere, and part of them end up in a stream flowing to the periphery.²

This chapter begins such a discourse by examining several issues surrounding the process by which the core dissipates entropy by transporting it to distant sinks located in the periphery. Discussion of this particular form of core-periphery reproduction proceeds in five steps. The first

section examines the scope of the hazardous waste stream problem. The second section provides a brief overview of the political-economic forces underlying the transport of hazardous wastes to the periphery. The third section contains a discussion of the vulnerabilities created in the periphery by hazardous waste imports. The fourth section examines the policy regimes that have emerged to deal with the hazardous waste stream problem. The chapter concludes with a discussion of what should be done to close the "global escape valve."

SCOPE OF THE HAZARDOUS WASTE STREAM

Core countries (which consume more than half of the world-system's natural resources and energy) produce 90 percent of the world's hazardous wastes (Sachs 1996; World Resources Institute 1994: 3–26). This waste is recovered-recycled, treated, and disposed of in various ways (including landfill, storage in surface impoundments, deep well injection, and incineration), but an undetermined proportion of it is exported to the periphery of the world-system (see, e.g., Anyinam 1991; Center for Investigative Reporting 1990; Greenpeace 1994; Hilz 1992; Stebbins 1992; Third World Network 1988; Vallette 1989; Vallette & Spalding 1990).³ U.S. Greenpeace (Vallette 1989; Vallette & Spalding 1990), for instance, has documented over 1,000 legal and illegal attempts between 1986 and 1988 by core countries to export over 160 million tons of hazardous wastes to countries of eastern Europe and the former Soviet Union, Asia, Latin America and the Caribbean, and Africa and the Middle East. Although many of these attempts failed, Greenpeace claims that at least 3.1 million tons of hazardous wastes were transported to the periphery during this period (Vallette 1989). Exported wastes included substances that are costly to dispose of: PCBs, acids, sludge, used car (lead acid) batteries, paint solvents, plastics, heavy metals (lead and mercury), dioxin-contaminated incinerator ash, and radioactive waste (Vallette & Spalding 1990). Destinations of core wastes in the 1980s tended to be countries located in Africa, the Caribbean, and Latin America, but in the 1990s, the destinations shifted to countries located in eastern Europe, the former Soviet Union, and Asia (Anyinam 1991; Greenpeace 1994; International Environment Reporter 1994; Leonard 1993). Between 1989 and 1994, there were 299 documented cases of hazardous waste exports to eastern Europe and the former Soviet Union, 239 in Asia, 148 in Latin America and the Caribbean, and 30 in Africa (Greenpeace 1994, cited by Sachs 1996: 144).

It is not possible to estimate how much hazardous waste finds its way to sinks located in the periphery because much of the waste leaving the

core is unregulated and unmonitored. Incompatible national definitions make it difficult to determine the amount of hazardous wastes produced and the amount flowing to the periphery from the core. The true scope of the problem is, therefore, unknown. Selected incidents of hazardous waste exports are reported below by major shipping route to illustrate the problem.

Eastern Europe and the Former Soviet Union

The Schoenberg dump in the former East Germany has been accepting 1 million metric tons of hazardous wastes (including heavy metals and chloridized hydrocarbons) annually from West Germany and other European countries since 1981. The 150-acre waste dump is surrounded by several drinking water sources (Nunez-Muller 1990). Numerous other sites located in the old eastern zone contain the hazardous wastes of Europe (Cezeaux 1991).

The former Soviet Union has accepted spent nuclear fuel from various European countries for years (Katasonov 1990: 30). There is no way of determining how much spent fuel is delivered annually to the country or what is done with it.

Between 1988 and 1989, 10,000 barrels of hazardous wastes (including chlorinated solvents and PCB-contaminated oils) were shipped to Poland from Austria (Cutter 1993: 138). In 1992 alone, 1,322 improper waste shipments from Germany were intercepted in Poland (Coll 1994).

Asia

In the mid-1980s, West Germany, Austria, Switzerland, and the United States expressed interest in storing nuclear waste in remote areas of the Chinese Gobi Desert. Rumors have persisted about continued Chinese interest in the venture (Vallette 1989; Vallette & Spalding 1990).

Since the late 1980s, large amounts of lead scrap and lead acid batteries have been shipped from the United States to southern China, India, Pakistan, the Philippines, Malaysia, and Taiwan for recycling (Center for Investigative Reporting 1990: 78–82; International Environment Reporter 1994; Leonard 1993).

Since the late 1980s, plastic wastes from West Germany, the United States, and several other countries have been incinerated in remote desert locations in China (Center for Investigative Reporting 1990: 78–82). Plastic wastes also are shipped regularly to other Asian countries for “recycling” (which includes incineration and landfilling in Bangladesh, Hong Kong, India, Indonesia, Malaysia, Pakistan, and the Philippines [International Environment Reporter 1994; Leonard 1992, 1993]). Between 1990 and 1993, 1,931,090 metric tons of plastic waste were sent to India (International Environment Reporter 1994: 114). In January 1993 alone, the United States sent 1,985.5 tons of plastic waste to India (Leonard 1993: 23).

Four U.S. companies mixed 1,000 tons of hazardous waste (including lead and cadmium) into a shipment of fertilizer bound for Bangladesh. Reports indicate that one-third of the fertilizer was applied to fields (often by children) before the contamination was discovered (Greenpeace 1992a; Leonard 1993: 22).

Latin America and the Caribbean

U.S. waste generators sent 27,803 tons of hazardous waste to Mexico in 1989. This figure reflects only legally exported wastes. Mexican maquiladoras have proven to be an important front for smuggling U.S. hazardous wastes for cheap disposal in Mexican waterways, sewers, municipal landfills, and numerous private property sites (Barry 1994; Center for Investigative Reporting 1990: 51–62; Sanchez 1990).

In 1992, four Philadelphia universities (Penn, Widener, Drexel, and Temple) approached representatives of Bermuda, Barbados, and the British Virgin Islands for permission to dispose of a jointly owned waste incinerator (Greenpeace 1992a: 25).

In 1988, 4,500 tons of toxic ash from the garbage incinerators of Philadelphia were unloaded from the ship *Khian Sea* on a Haitian beach (Center for Investigative Reporting 1990: 17–32).

In 1992, it was reported that imports received by a petroleum recycling plant in the port of Esmeraldas, Ecuador, consisted of hazardous wastes (Biggs 1994: 349).

Africa and the Middle East

The fishing village of Koko, Nigeria, became the subject of world attention in 1988 when 8,000 drums of toxic waste were discovered. The wastes (exported by an Italian firm for several European countries and the United States) included methyl melamine, dimethyl formaldehyde, ethylacetate formaldehyde, and about 150 tons of PCBs. The deal had been arranged by an Italian trader with a Nigerian citizen, who received \$100 a month to store the wastes on a dirt lot (Anyinam 1991: 762–763).

In 1988 an Italian firm (Jelly Wax) shipped 2,000 barrels of toxic wastes to Beirut, Lebanon. Reports indicate that part of the waste was burned, some was dumped in the sewers, and the remainder was buried at different locations in the country (Samhoum 1989).

Greenpeace (1992a) reported in 1992 that a Swiss firm planned to construct and operate a million-ton-a-year toxic waste incinerator in Mozambique.

A U.S. company and several European companies have shipped tons of mercury waste to a British reprocessing plant located at Cato Ridge, South Africa, just outside the homeland of Kwa Zulu. Villagers located downstream from the facility on the Mngweni River have used the river for drinking, bathing, and

washing. Mercury levels in the river have been reported to be 1,000 to 1,900 times higher than the World Health Organization's recommended level (Greenpeace 1992b: 12–13).

Between 1984 and 1986, radioactive waste from the former Soviet Union was illegally dumped in Canna and Dan, Benin. The problem was discovered in 1989 after contaminated groundwater was found (Cutter 1993: 137).

THE POLITICAL ECONOMY OF THE HAZARDOUS WASTE STREAM

Political and economic forces characterizing relations within and between countries of the core and periphery have created the hazardous waste flow to the periphery (Covello & Frey 1990; Hilz 1992; Puckett 1992). The often-contradictory demands between capital accumulation and environmental quality within the core have created a tendency for hazardous wastes to be transported to sinks located in the periphery. The economic problems facing many peripheral countries have, in turn, led them to accept wastes for hard currency.

Contradictory Forces in the Core

A set of interrelated political and economic forces within the core underlie the flow of hazardous wastes. They include increased levels of hazardous waste production and reduced disposal capacity, increased environmental awareness and more stringent state regulatory control on hazardous waste disposal, and increased economic and political pressures on the waste generators.

Hazardous Effluence and Affluence

Reliable data on the production of hazardous wastes do not currently exist, but there is consensus that the production of hazardous wastes has grown substantially since World War II (Ayers 1994; Commoner 1992; Schnaiberg 1980). This has been attributed to market forces requiring economic growth through increased consumption, as well as technological changes in the production of petroleum, chemicals, electronics, pharmaceuticals, and related products. From an annual production of 15 million tons in the early 1940s, the world-system currently produces annually anywhere from 300 to 600 million tons of hazardous wastes (Gourlay 1992; Postel 1987: 9).⁴ Conservative estimates reported in Table 5.1 indicate that the United States is the largest single producer of hazardous wastes; it is estimated to produce 238 million tons each year, or about 1

ton per capita. Although the European countries produce less hazardous waste than the United States because of greater production efficiency, they do produce millions of tons. The 12 members of the European Community (EC) produce 30 to 40 million tons of hazardous waste each year. The remaining countries of the world-system produce 35 to 40 million tons annually.⁵ The production of hazardous wastes in the core has been so great in the past several decades that the ability of many countries to dispose of it (whether through landfilling, treatment, or incineration) has declined substantially.

TABLE 5.1
Annual Production of Hazardous Wastes in the World-System, circa 1987

Country	Population (1000)	Hazardous Wastes (1000 tons)	Tons (per capita)	GNP (\$) (per capita)
Australia	16,900	300	0.02	11,103
Austria	7,600	400	0.05	11,980
Belgium	9,800	915	0.09	11,476
Canada	26,500	3,000	0.12	15,160
Denmark	5,100	112	0.02	14,939
Finland	5,000	230	0.05	14,463
France	56,100	3,000	0.05	12,789
Germany (West)	61,000	14,210	0.23	14,399
Greece	10,000	423	0.04	4,015
Ireland	3,700	20	0.005	6,129
Italy	57,100	3,640	0.06	10,355
Japan	123,500	666	0.005	15,764
Netherlands	14,900	1,500	0.10	11,856
New Zealand	3,400	60	0.02	7,764
Norway	4,200	200	0.05	17,203
Portugal	10,300	165	0.02	2,827
Spain	39,220	1,708	0.04	5,972
Sweden	8,400	500	0.06	15,636
Switzerland	6,600	400	0.06	21,332
Turkey	55,900	300	0.005	1,213
United Kingdom	57,200	2,200	0.04	10,419
United States	249,200	238,327	0.96	18,529
Eastern Europe		19,000		
Rest of world		16,742		
Total		308,318		

Source: Adapted from Susan Cutter (1993: 113) and World Resources Institute (1990).

Increased Environmental Awareness and State Regulation

Scientific and public concern with the health and environmental risks associated with hazardous wastes emerged as an important issue in the core during the 1970s (Brickman, Jasanoff, & Ilgen 1985; Hays 1987). This concern gave rise to increased regulatory controls on waste disposal in the United States (Fiorino 1995; Szasz 1994). These regulatory efforts represent a combination of federal statutes and administrative agency-promulgated rules. The U.S. Resource Conservation and Recovery Act of 1976 was a comprehensive piece of legislation creating standards for the classification, hauling, and disposal of hazardous wastes and a system for tracking wastes. Subsequent legislation such as the 1980 Comprehensive Environmental Response, Compensation, and Liability Act (commonly known as Superfund), the 1984 amendment to the Resource Conservation and Recovery Act, and the 1986 Superfund Amendments and Reauthorization Act have significantly curtailed the haphazard disposal of hazardous wastes into the air and water and increased the amount of wastes earmarked for specialized disposal. (Prior to Superfund in 1980, there was little need to export waste, because "more than 90% of all wastes were indiscriminately and . . . cheaply dumped in nearby pits, ponds, and lagoons all over the U.S." [Biggs 1994: 337].) Increased regulation is thought to have forced half of the 4,600 waste facilities to close in the 1980s (S. Murphy 1994: 30). Similar legislation was enacted in Europe and Japan (Brickman, Jasanoff, & Ilgen 1985).

Increased Economic and Political Pressures

The outcome of these interrelated trends is increased disposal costs in the core. In the United States, for instance, landfill disposal costs (which currently range from \$250 to \$300 per ton of hazardous waste) grew 16-fold in the past 20 years, and incineration costs (which currently cost at least \$1,500 and as much as \$3,000 per ton) increased threefold in the last decade. European countries have experienced similar cost increases (Hilz 1992: 44–46).

Few communities in the core countries want hazardous waste repositories because of the health and environmental risks associated with such facilities. Not-in-my-backyard behavior of core communities has grown dramatically since the discovery of sites (such as Love Canal and Times Beach) where wastes were dumped haphazardly. Environmental groups monitoring waste disposal also have created public pressure against haphazard waste dumping. These forces have made it more difficult for

companies to dump wastes in the core (see Brown & Mikkelsen 1990; Bullard 1994; Szasz 1994).

Waste generators have responded to these economic and political pressures by hiring brokers to export hazardous wastes to the periphery through various "trash for cash" schemes that are much cheaper than domestic disposal and recycling (Hilz 1992; Vallette 1989; Vallette & Spalding 1990). Current export practices include what several analysts have called "compliant waste handling," "sham" and "dirty" recycling, and "criminal activity" (Hilz 1992: 24–30; Puckett 1994).⁶ Compliant waste handling refers to hazardous waste exports that are legal and meet local, national, and international restrictions. Sham recycling is the dumping of hazardous waste in the periphery under the guise of recycling that never takes place. Dirty recycling, on the other hand, results in some waste recuperation, but it is a process that is hazardous to human health and the environment. Criminal activity consists of waste smuggling and other illegal practices that endanger human health and the environment.

Costs of waste disposal are considerably less in the periphery because of lower wages and limited state control of the environment and the health, safety, and well-being of its citizens. Waste can be dumped in the periphery for as little as \$5 to \$50 per ton (Anyinam 1991; Logan 1991). Furthermore, international bulk flow container costs have declined substantially in the past decade, reducing the cost of shipping wastes to sinks located in the periphery (Shin & Strohm 1993). The reduced costs of transporting entropy to the periphery enhance the competitiveness of waste generators at the national and international levels and contribute to capital accumulation in the core.

Crisis in the Periphery

Many peripheral countries face economic pressures to accept hazardous wastes from the core even though they have limited expertise in treating, storing, and disposing wastes. They are confronted with poverty, debt, low agricultural and mineral commodity prices, and a world-system that does not allow them to participate fully in economic production and exchange. An illustrative example is the case of Guinea-Bissau, which was offered a deal in 1988 (which it rejected) to store 15 million tons of hazardous waste for a sum of cash that was four times larger than its gross national product and two times larger than its foreign debt (Puckett 1994: 53). Not only does the economic situation of many peripheral countries push them to swap hazardous wastes for cash but also their political situation puts them in a weak bargaining position in negotiations with core

waste brokers over the terms of hazardous waste exchanges. Corrupt and politically unaccountable state officials often sanction and negotiate the terms surrounding waste shipments from the core (Puckett 1994).

VULNERABILITIES GENERATED BY THE HAZARDOUS WASTE STREAM

Hazardous wastes (like many hazardous substances) can damage the environment and adversely affect human health through dispersion in the soil, water, and air or in the form of explosions and fires (World Health Organization 1988). Peripheral countries are particularly vulnerable to such risks because of a low level of public awareness of risks and limited technical and regulatory capabilities for adequately regulating and disposing of hazardous wastes, handling accidents, and monitoring the environment (Covello & Frey 1990). In addition to potentially serious environmental and human health consequences associated with hazardous wastes, there are a number of other undesirable consequences; these include various social costs and reduced efforts to curb the generation of hazardous wastes in the core (Asante-Duah, Kofi, Saccomanno, & Shortreed 1992; Center for Investigative Reporting 1990; Daly 1993; Hilz 1992).

Environmental Effects

The improper disposal, treatment, and storage of hazardous wastes in the periphery can contribute to the risk of environmental damage (Hilz 1992; Third World Network 1988). Environmental damage includes soil contamination, ground water pollution, biodiversity loss, contamination of rivers and coastal regions, air pollution, and threats to plant and animal health. Most research done on the environmental effects of hazardous wastes is limited to the temperate climates of the core countries, but the effects of hazardous wastes in the tropical regions of the periphery may be very different and far more severe (Logan 1991). Importing countries that improperly dispose of waste also may put surrounding countries at risk by contaminating rivers and aquifers, as well as polluting oceans and air (see Barry 1994). Because reliable data do not exist on the full breadth and nature of hazardous waste disposal in the periphery, it is not possible to estimate the extent of environmental damage. Such damage is a potentially important problem because it could deplete important natural resources, destabilize ecosystems, and threaten human health.

Human Health Effects

The actual health consequences associated with exposure to improperly disposed wastes in the periphery are not fully known. Given the experiences of the core countries and random reports from several peripheral countries (Brown & Mikkelsen 1990; Center for Investigative Reporting 1990; Gourlay 1992; National Research Council 1991; Third World Network 1988), improperly disposed wastes pose a threat to those experiencing environmental exposure. Those exposed to contaminated water, food, or air are at substantially increased risk of death and disease because of their increased susceptibility to various site-specific cancers, skin irritation, respiratory problems, neurobehavioral problems, birth defects and miscarriages, genetic changes and damage to the immune system, and acute and chronic damage to specific organs of the body. In turn, disposal of hazardous waste in food-producing countries of the periphery can affect human health in the core through contaminated food exports. On the other hand, those living near hazardous waste storage and disposal sites are at increased risk of death and injury from fires and explosions. Because reliable data do not exist on the number of people exposed to improperly disposed wastes in the periphery, it is not possible to estimate the actual number of deaths or cases of disease and injury that can be attributed to waste exports, but one thing is clear: peripheral countries are at far greater risk than their core counterparts (Logan 1991).

Social Effects

The distribution of the benefits and costs associated with hazardous waste exports is unequal. Most benefits go to the core countries that generate and export the wastes; importing countries bear most of the costs. Losses within importing countries also are distributed in an unequal fashion, because some groups and regions are able to capture benefits and others bear the costs. Surrounding countries also may bear some of the costs as wastes move across national boundaries through the air, water, and food. Future human generations may bear costs without enjoying any of the benefits associated with the export of hazardous wastes (Logan 1991).

Reduced Pressure for Hazardous Waste Reduction in the Core

If core-based waste generators have the option of exporting their hazardous wastes to the periphery, there is little incentive for them to curb hazardous wastes through recycling or source reduction strategies (Daly

1993). In turn, the effectiveness of current waste reduction strategies in the core may be weakened if the export option remains a viable alternative for waste generators. The export option, therefore, reduces waste minimization efforts in the core and represents a means for core-based waste generators to maintain inefficient and waste-generating production practices.

A Cost-Benefit Assessment

The short-term economic benefits associated with hazardous waste transfers from the core to the periphery must be considered in light of the long-term (tangible and intangible) costs (Daly 1993; Logan 1991). The costs associated with the future cleanup of contaminated sites and improperly disposed wastes are potentially high for countries of the core and periphery, but even more so for countries of the periphery. (The estimated cost of cleaning up Koko, Nigeria, for instance, was more than \$1 million, but the entire environmental budget of the country in 1987 was \$255,000 [Donald 1991: 446, note 140].) The treatment and compensation of victims of hazardous waste exposure in the periphery are potentially very costly. Destruction of important natural resources such as marine life, biodiversity, and soil, water, and air quality is also likely to be a costly outcome of hazardous waste exports. The costs surrounding inequalities in the exposure to hazards and the failure to reduce hazardous waste production in the core are also likely to be great.

Despite suggestions and efforts to the contrary (Asante-Duah et al. 1992; Logan 1991), there is no accepted factual or methodological basis for adequately identifying, estimating, and valuating the costs and benefits associated with the flow of hazardous wastes to the periphery. Comments of former World Bank chief economist Lawrence Summers (*The Economist* 1992: 66) are worth quoting here because they illustrate some of the difficulties and contradictory outcomes of traditional economic reasoning: "The measurement of the costs of health-impairing pollution depends on the foregone earnings from increased morbidity and mortality. From this point of view a given amount of health-impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages. I think the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable and we should face up to that." Such economic reasoning is based on the belief that not all humans are of equal value: human lives in the periphery are worth less than those in the core. Thus, although most costs are borne by the periphery (and most benefits are captured by the core), the costs to the

periphery are deemed minimal and acceptable because life is defined as worth so little, or, as Herman Daly (1993: 57) has noted: "By separating the costs and benefits of environmental exploitation, international trade makes them harder to compare." Even if the total economic costs and benefits could be meaningfully estimated and valued, it is doubtful that the benefits accruing to the periphery would cover the immediate and most tangible costs associated with hazardous waste imports (see Logan 1991).

POLICY REGIMES

Various unilateral, bilateral, and multilateral actions have been proposed to deal with the problem of hazardous waste exports to the periphery (Allen 1995; Kitt 1995; S. Murphy 1994; Puckett 1992; Wynne 1989). These proposals emphasize actions of core and periphery states, international organizations, and nongovernment organizations. Proposed actions for the core states have included policy efforts to implement cleaner production practices, the establishment of restrictions on the export of hazardous wastes, the dissemination of information about hazardous wastes to importing countries, and implementation of a ban on the export of all hazardous wastes to the periphery. It has been proposed that peripheral states ban hazardous waste imports, develop risk assessment and management capabilities, and develop liability laws protecting victims and providing criminal liability for certain export practices. Recommended actions for international organizations have included the dissemination of risk information, technical assistance in the establishment of monitoring and management programs in the periphery, and the establishment of restrictions on hazardous waste dumping through various conventions and liability and compensational regimes. Recommendations for core and periphery nongovernment organizations include investigation of the problem of hazardous waste exports and the attendant health and environmental risks, as well as the economic and political consequences of hazardous waste exports (Kitt 1995; S. Murphy 1994; Puckett 1992, 1994; Third World Network 1988; Wynne 1989).

Many obstacles stand in the way of the effective implementation of these and related proposals. These include limited funding; questions surrounding the importing country's national sovereignty; issues regarding who should be responsible for disseminating risk information, monitoring wastes, and enforcing regulations; and disclosure of corporate practices (Susskind 1994). Despite such obstacles, several regimes have been adopted that attempt to restrict the hazardous waste flow to the periphery

(Allen 1995; Donald 1992; Hilz 1992; Kitt 1995; Kummer 1992; Puckett 1992, 1994). The following are selected examples:

The United Nations Environment Programme's Basel Convention (the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal) was signed by 118 countries in March 1989. This convention was the first attempt to systematically regulate the international transport and disposal of hazardous waste at the global level. It established some control on the international transfer of hazardous wastes, including the requirement that exporting countries receive prior informed consent from the importing country before wastes are shipped. Under this convention, nations can forbid waste importation or require more information before consenting to accept wastes. A subsequent amendment to the convention in March 1994 outlawed the export of hazardous wastes to peripheral countries by core countries (Allen 1995; International Environment Reporter 1995a; Kummer 1992).

The Lome IV Convention adopted on December 15, 1989, by the 12 EC countries and 69 African, Caribbean, and Pacific countries bans the movement of EC hazardous wastes to the African, Caribbean, and Pacific countries (Puckett 1994).

The Organization of African Unity (consisting of all African countries except Morocco and South Africa) adopted the Bamako Convention (the Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa) regulating waste movement among African nations and banning the importation of all radioactive and hazardous wastes into the African continent. The Bamako Convention was adopted because many of the African nations did not think that the Basel Convention met their needs (Donald 1992).

The Wangani Convention (the Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Waste within the South Pacific Region) bans imports of hazardous and radioactive wastes from outside the convention area in the developing countries of the Pacific Islands (International Environment Reporter 1995b, 1995c).

As of late 1992, nearly 90 nations had banned imports of hazardous wastes (Puckett 1994).

These and related attempts to curb the hazardous waste flow to the periphery have been subjected to numerous criticisms. Efforts to control and regulate the waste flow through regimes such as the Basel Convention have been dismissed as nothing more than attempts to legalize core dumping practices (Cusack 1990; Donald 1992; Kitt 1995; Puckett 1992,

1994; Wynne 1989). If a nation consents to accept hazardous wastes for disposal but does not have the capacity to control and monitor such wastes, the prior informed consent rule is not likely to lead to the handling of the wastes in a safe and environmentally sound manner. Even efforts like the 1994 amendment to the Basel Convention outlawing hazardous waste exports to the periphery are unlikely to be enforced fully. Furthermore, there is no regulatory mechanism for adequately controlling the transfer of hazardous waste-generating industries to the periphery, and there are few liability and compensation provisions (Frey 1996). On the other hand, peripheral country efforts to prohibit hazardous waste imports are unlikely to be fully effective because of the limited regulatory capacity of the peripheral countries and the fact that waste traders will find dumping sites as long as hazardous wastes are produced and the economic incentives remain for trash and cash swaps. Existing policy regimes have done little to dismantle the dissipative structure of the world-system.

CONCLUSIONS

The image of ghost ships laden with hazardous cargo traveling from the core to the periphery is a disturbing one. Unlike the Flying Dutchman, however, many of these "gypsy vessels" have reached port and deposited their cargoes of PCBs, cyanide, paint solvents, dioxin-contaminated incinerator ash, and lead acid car batteries on unsuspecting populations in Mexico, Nigeria, the homelands of South Africa, China, the Sudan, the former Soviet Union, South Korea, East Germany, and many unknown spots throughout the world (Center for Investigative Reporting 1990; Greenpeace 1994; Third World Network 1988; Vallette 1989; Vallette & Spalding 1990). These export practices have been described as racist (Alston & Brown 1993; Mpanya 1992), but they represent something much more: the unequal power relations underlying interaction patterns between countries occupying different positions in the world-system. Centrality in the world-system allows countries to engage in not-in-my-backyard behavior and impose their entropy on the periphery.

The problem can be usefully framed in terms of responsibility: those who create hazardous waste and benefit from its production should bear the costs associated with its disposal (R. Murphy 1994). Failure to accept this responsibility (because of the belief that the international waste trade is economically efficient, legal, safe, beneficial for those put at risk, or based on the consent of those put at risk) is ethically suspect (Shrader-Frechette 1991). Acceptance of this responsibility leads to the conclusion that the export of hazardous wastes to the periphery should be outlawed

and strong measures should be taken to ensure that such a ban is fully implemented. Such a policy would make it difficult for the core countries to externalize their entropic costs on the periphery and pressure them to adopt production practices generating fewer hazardous wastes. Until the global political authority exists to effectively monitor and control the global waste trade, these two goals will remain elusive. However, closure of the "global escape valve" is unlikely as long as the core countries are able to control a majority of the wealth generated in the world-system.

NOTES

1. Hazardous waste typically is defined as waste (possessing chemical, physical, or biological characteristics) that threatens the environment or human health. Hazardous wastes can take the form of solids, liquids, sludges, or gases that are ignitable, corrosive, reactive, as well as toxic, including carcinogenic (cancer causing), mutagenic (mutation causing), and teratogenic (birth-defect causing) (Dowling & Linnerooth 1987; Gourlay 1992: 20–22; World Health Organization 1988). Defining hazardous wastes is not as clear-cut as suggested here, because there are many social, political, and economic factors involved in defining hazardous wastes (Dowling & Linnerooth 1987; Kitt 1995: 494–495; Wynne 1987).

2. Hazardous products and production processes also flow from the core to the periphery (e.g., Barry 1994; Castleman & Navarro 1987; Covello & Frey 1990; Frey 1995, 1996, in press). There is also increased concern with the movement of pollutants from the core to the periphery through the air, soil, and water, as well as the pollution of the global commons by the core countries (e.g., Barry 1994; Huq 1994; Majone 1985).

3. Some of this waste is dumped in poor and minority communities within the core countries (Bryant & Mohai 1992; Bullard 1993, 1994; Cutter 1993: 121–132).

4. Most estimates of the amount of hazardous waste produced refer to those generated by commercial and industrial interests, but the military also produces a substantial amount of hazardous waste (Shulman 1992).

5. The bivariate correlations between gross domestic product per capita and the production of hazardous wastes (including heavy metals, carbon dioxide, chlorofluorocarbons, and the like) for a sample of 70 core and peripheral countries in the early 1990s are all 0.7 or greater, suggesting that affluence promotes effluence (see Huq 1994 and Moomaw & Tullis 1994).

6. Some industries that generate hazardous wastes have relocated to the periphery, where health, safety, and environmental standards are lax (see, e.g., Barry 1994; Castleman & Navarro 1987; Covello & Frey 1990; Frey 1996; Leonard 1988).

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II

LAND TRANSPORT

6

The Spatial Organization of Trade and Class Struggle over Transport Infrastructure: Southern Appalachia, 1830–1860

Wilma A. Dunaway

THEORETICAL BACKGROUND

Inland from the Atlantic coast of North America rise the Appalachian mountains. This region has been stereotyped as a “subsistent region of refuge” (Chase-Dunn 1989) that remained resistant to capitalist development until the early twentieth century. Rugged terrain and the lack of roads supposedly deterred external trade, prevented the growth of an export economy, and slowed the development of capitalist enterprises (Eller 1982). My own revisionist research now has attacked that historiography (Dunaway 1996a). In reality, southern Appalachia was absorbed into the capitalist world-system as part of the extended Caribbean (Wallerstein 1989), that vast New World region stretching from Brazil to present-day Maryland. During the global expansion cycle of 1672–1700, southern Appalachia was incorporated as a peripheral fringe of the European colonies located along the southeastern coasts of North America. Southern Appalachia was, in fact, one of the major frontier arenas in which England, France, and Spain played out their hegemonic imperialism for core status. Blocking easy expansion into the Ohio and Mississippi valleys was that vast mountain range stretching from present-day western Maryland and West Virginia to northern Alabama. The first stage of capitalist incorporation occurred in the eighteenth century with the integration of southern Appalachia’s indigenous Cherokees into the international fur trade (Dunaway 1994).

After the American Revolution, settler capitalists continued the transformation of southern Appalachia into the first frontier-periphery located within the newly formed United States. This research focuses on that second historical era of deepening incorporation by investigating these five questions:

What was the role of southern Appalachia in the capitalist world economy?

Through what transport systems was this mountainous terrain articulated with global commodity chains?

Who were the Appalachian agents who organized the flow of commodities from and into this mountainous periphery?

How did class conflict over transport infrastructure deepen capitalist inequalities in the region?

How did transport lag deepen the peripheralization of this region?

CAPITALIST INCORPORATION OF THE FIRST AMERICAN FRONTIER

During the nineteenth century, the world's geographical regions were hierarchically integrated into a framework of production processes structured around three interdependent specializations: zones to produce export staples; support zones to provision the export areas and their urbanizing centers; and support zones that warehoused, distributed, and transported commodities between markets. Those areas cultivating staple exports could acquire cheap raw materials and laborers from contiguous regions. Thus, the emergence of cash-crop zones stimulated the expansion of market-oriented food production in adjacent zones (Wallerstein 1989). In Latin and South America and the Caribbean, there developed a "continuous interplay of plantations and small-scale yeoman agriculture" (Frank 1979: 123). In order to maximize access to international markets, the Europeans concentrated their export zones along the coasts. To supply food to the coastal plantations, a second type of "production regime" was adapted to the inland, more mountainous terrain. In those zones, smaller-scale farms and manufacturing enterprises generated grains, livestock, and extractive commodities to provide provender to the coastal export centers (Frank 1979). Areas lacking easy market access were transformed into the "livestock frontiers" of the nineteenth-century world economy (Duncan-Baretta & Markoff 1978). In addition, extractive industry emerged in the inland mountains of the New World colonies, replicating

the pattern that western Europe had followed in its own transition to capitalism (Kriedte, Medick, & Schlumbohm 1981).

World wide, mountain ecosystems have been exploited as peripheral fringes of adjacent capitalist zones (Dunaway 1996b). On a world scale, therefore, southern Appalachia's role was not that different from many other such peripheral fringes at the time, including inland mountain sections of several Caribbean islands, Brazil, and central Europe (Wallerstein 1989). Incorporation into the capitalist world economy triggered within southern Appalachia agricultural, livestock, and extractive ventures that were adapted to the region's terrain and ecological peculiarities. Yet, those new production regimes paralleled activities that were occurring in other colonized sectors of the New World. Fundamentally, southern Appalachia was a "support zone" that supplied raw materials to other agricultural or industrial export regions of the world economy.

On the one hand, this inland region exported foodstuffs to other peripheries and semiperipheries that, in turn, exported staple crops to the core. It is not by accident that the region's surplus producers concentrated their land and labor resources into the generation of wheat and corn — often in terrain where such production was ecologically unsound. The demand for flour, meal, and grain liquors was high in plantation economies (like the North American South and most of Latin America) where labor was allocated toward the production of exotic staples, not foods (Wallerstein 1989). It also was not a chance occurrence that southern Appalachians specialized in the production of livestock, as did inland mountainous sections of other zones of the New World. The demand for meat, work animals, meat derivatives, and leather was high in those peripheries and semiperipheries of the world economy that did not allocate land to less-profitable livestock production (Frank 1979). In 1860, southern Appalachian counties exported nearly 6.5 million bushels of wheat, more than 26 million bushels of corn, 30.5 million pounds of tobacco, and 121,542 bales of cotton. In addition to their crops, Appalachian farmers exceeded Southern averages in their per-capita production of hogs, cattle, sheep, horses, and mules and their export of massive amounts of animal byproducts (Dunaway 1996a).

On the other hand, southern Appalachia was also a production regime that supplied raw materials to the emergent industrial cores of the northeastern United States and western Europe — zones that had a voracious appetite for Appalachian minerals, timber, cotton, and wool. Gold, salt, coal, copper, manganese, lead, timber, and several other mineral resources poured out of the Appalachian mountains to fuel expanding core industries. Nearly one-half of the region's antebellum extractive output was

generated for export, and several Appalachian counties produced extractive commodities solely for consumption by distant manufacturing centers. Moreover, regional exports of manufactured tobacco, grain liquors, and foodstuffs stockpiled those sectors of the world economy where industry and towns had displaced farms (Dunaway 1996a). Antebellum journalists believed that the cotton South was dependent upon the Upper South for grain, cattle, hogs, horses, and mules (*DeBow's Review* 19: 1855). However, Mississippi Valley residents consumed only two-thirds of the flour and beef, three-quarters of the corn, and 86 percent of the pork received at New Orleans between 1858 and 1861 (Lindstrom 1970).

Thus, much of the Appalachian surplus received in Southern ports was redistributed to the urban-industrial centers of the U.S. Northeast and to foreign plantation zones of the world economy (Dunaway 1996a). By the 1840s, the Northeastern United States was specializing in manufacturing and international shipping; and that region's growing urbanizing centers were experiencing food deficits (Wallerstein 1989). Consequently, by 1860, three-fourths of the Upper South grain received at Southern seaports was being reexported to the Northeast (Lindstrom 1970). In return for raw ores and agricultural products, Southern markets — including the mountain counties — consumed nearly one-quarter of the transportable manufacturing output of the North and received a sizable segment of the redistributed international imports (e.g., coffee, tea) handled by Northeastern capitalists (Billington 1967).

Beginning in the 1820s, Great Britain lowered tariff rates and eliminated trade barriers to foreign grains. Subsequently, European and colonial markets were opened to North American commodities. It is little wonder, then, that flour and processed meats comprised the country's major nineteenth-century exports or that more than two-thirds of those exports went to England and France (Holtfrerich 1989). Outside the country, then, Appalachian commodities flowed to the manufacturing centers of Europe, to the West Indies, to the Caribbean, and to South America. Through far-reaching commodity flows, Appalachian raw materials — in the form of agricultural, livestock, or extractive resources — were exchanged for core manufactures and tropical imports (Dunaway 1996a).

In the North American Southeast, nineteenth-century commerce "was in effect a triangle with one apex on the near-by coast, at Charleston or Savannah, a second in the Tennessee-Ohio region, say at Knoxville, Nashville, or Cincinnati, and a third in the district of metropolitan commerce, Baltimore or New York" (Phillips 1908: 393). At the local level, production for export stimulated the development of towns and villages that served as the intermediate hubs for forwarding commodities to the

outside world. "The movement from farm to market generated employment opportunities and attendant urban systems that varied with the particular staple involved and the technique of marketing" (Earle & Hoffman 1976: 9).

THE SPATIAL ORGANIZATION OF COMMODITY TRANSPORT

On the one hand, sectors of the world economy were interdependent around product specializations; trade revolved around exchange of the resulting variety of export commodities. On the other hand, the world economy must be organized to mobilize those goods between geographically distant areas. Thus, zones were differentiated not only by their production regimes but also by their roles in the distribution process. Spatially, the villages, towns, and cities of the capitalist world economy were hierarchically structured into interlocking networks of production zones, distribution zones, and consumption zones. Interconnected by networks of oceans, rivers, canals, turnpikes, roads, and, later, railroads, these three layers of distribution points made international trade possible. How, then, was southern Appalachia integrated into this global system?

Antebellum Appalachian towns and villages were hubs of commercial interaction with other regional communities and with distant territories. Capitalistic trading triggered a network of commodity chains in which "urbanizing" centers subsumed nearby smaller towns, villages, and hamlets. Consequently, the region's larger towns gradually became "foreign bodies" in their local economies, "looking beyond [their] narrow surroundings and out towards the greater movement of the outside world, receiving from it rare, precious goods unknown locally, which [they] sent in turn to smaller markets and shops" (Braudel 1981: 2, 117).

In this way, the region's fragile town economies were integrated into the spatial organization of the capitalist world-system (Wallerstein 1989). It was through these towns and villages that the region's trade goods moved, because public inspection stations, banking, merchants, and manufacturers were centralized there. Small towns were intermediate distribution points for large volumes of trade goods moving out of and into the Appalachian hinterlands. From smaller towns, trade goods moved to larger regional trading hubs that provided export linkages for the distant transport of bulky or perishable produce and offered import linkages for the wholesale distribution of foreign goods. Situated at major transportation crossroads, the region's larger towns functioned as bulking centers (Wallerstein 1989) for adjacent smaller villages, agricultural hinterlands,

and extractive enclaves. Cumberland and Hagerstown, Maryland; Staunton and Winchester, Virginia; Wheeling, Morgantown, and Charleston, West Virginia; Knoxville and Chattanooga, Tennessee; and Rome, Georgia were regional distribution centers for the export of Appalachian commodities and for the import of foreign goods back into the countryside. In a sense, then, these centralized towns served as first-level distribution zones for large adjacent agricultural, manufacturing, and extractive production zones.

From these Appalachian bulking centers, exports were shipped to several external inland distribution centers that lay between Appalachia and the North American coasts. Appalachian livestock and extractive commodities were exported through major transshipment centers in the Northeast, the Southeast, and the Midwest, including Cincinnati, Philadelphia, Louisville, and Richmond. From these inland intermediate points, Appalachian exports finally arrived at one of several Southern or Northeastern seacoast entrepôts, from which these goods were redistributed inland to nearby consumers or were shipped by ocean to distant domestic or foreign markets. By the 1840s, specialized commodity exchanges operated in Philadelphia, Charleston, New Orleans, and Baltimore, where Appalachian cotton, lumber, tobacco, wheat, textiles, and livestock were warehoused and shipped forward.

SOUTHERN APPALACHIA'S INTERMODAL TRANSPORT SYSTEMS

To permit commodities to flow between zones of production, zones of distribution, and zones of consumption, transport mechanisms move goods through structured commodity chains. As part of the integrated national and international system, southern Appalachia developed intermodal transportation networks to effect articulation with external transport networks. Throughout most of the antebellum period, rivers comprised the dominant medium for accomplishing interregional trade throughout the United States (Haites & Mak 1970). Even though it was inland, Southern Appalachia was not landlocked in mountainous isolation. Two-thirds of the region's counties were intersected by 14 navigable river systems and three canals that linked them into the broader system of national waterways that fed ultimately to the Atlantic or Gulf seacoasts.¹

Along these waterways, more than 500 small communities became landings for commercial activity and boat construction. Licensed by county courts as public monopolies, hundreds of local ferries played a crucial part in the flow of commodities from inland areas to the river systems

(Dunaway 1996a). As the “staging areas” for downriver flatboat movements, ferries were often collection points for agricultural or extractive exports and for the redistribution of imported goods (Haites & Mak 1970). Because they were intermodal points between wagon and water transport, ferry sites stimulated the emergence of adjacent inns, warehouses, stores, and manufactories (Dunaway 1996a).

In short, waterways were the avenue for rapid transport of bulky agricultural, extractive, or manufactured commodities out of the region. Several types of river craft linked together the region’s major waterways, canals, and ferries. For unidirectional transport downriver, local companies constructed flatboats, tobacco canoes, broad horns, Kentucky boats, and bateaux. To permit round-trip travel, exporters relied on larger keelboats or packet boats, and — after 1840 — more versatile steamboats. Flatboats and arks carried goods out of tributaries where larger boats could not float safely. Special barges and tows were used on canals; stationary, horse-rope propelled boats were operated at ferries. These smaller craft carried commodities to intermediate sites for transfer to larger packets or steamboats, forming an interdependent network of shipping methodologies that plied different parts of the rivers (Haites & Mak 1970). By 1840, all the major navigable Appalachian rivers and many of the secondary tributaries were regularly served by steam towboats, packet boats, and larger steamboats. As the primary vehicle for antebellum export trade, Appalachian steamboats averaged 12 round trips annually, many losing only 90 days per year because of unnavigable rivers. In 1835, the downriver steamboat trade on the Ohio River totaled nearly \$15 million, at least half that amount deriving from the Appalachian counties of the Ohio Basin (Haites & Mak 1970). Export along the region’s internal rivers and canals was equally intensive (Dunaway 1996a).

Export by river was intricately structured, however, because this mode of transportation required skilled specialists. River wharves, landings, and warehouses were owned and operated by companies that accepted goods on consignment for transport to distant markets. For example, James King and Company plied the Tennessee with keelboats and steamers, averaging one trip monthly. On all the Appalachian rivers, boatyards developed as points for accumulating commodities for export or for wholesale distribution (Dunaway 1996a). State legislatures created as public monopolies numerous navigation companies that were authorized to make river improvements, construct boats, operate landings for tolls, and accept payment to transport passengers and commodities by river. On the Ohio River and its tributary rivers, several cartels were formed among canal and

steamboat companies to control freight rates and to maximize profits related to external transport (Haites & Mak 1970).

Connecting to these waterways, several networks of state turnpikes and county roads further linked Appalachian communities into national commodity chains. Fifty-nine Appalachian counties relied solely on major river access. However, more than one-half of the region's counties were transversed by major thoroughfares that carried livestock droves and trade goods to distant markets in other states. Two major national turnpikes crisscrossed southern Appalachia (Dunaway 1996a). Running east to west, the National Turnpike linked Baltimore to the Ohio River at Wheeling to proceed into the Midwest. From Philadelphia via Hagerstown, Maryland, the Great Wagon Road proceeded down the valley of Virginia to link with routes into east Kentucky and east Tennessee (Rouse 1973). Interlinked with these national turnpikes were several major Appalachian livestock and wagon routes that connected the region to major coastal trade centers and to Deep South cities (Heath 1954). With more than three-quarters of its land area linked by major trade routes to interstate thoroughfares, pre-1850 southern Appalachia was no more isolated from the national economy than were most rural areas of New England or much of the Midwest (Dunaway 1996a).

Throughout most of the antebellum period, southern Appalachians relied on five techniques of direct intermodal transport: packhorses, stages, wagons, boats, and overland drives. During the frontier years, residents of the most rugged terrain exported iron bars, salt, ginseng, furs, whiskey, and a variety of produce by packhorses. Stage coaches also hauled commodities to and from farms, merchants, and towns along their routes (Dunaway 1996a). People who lived along major roads sent their goods to market by passing wagoners or stages that brought imports on their return trips (Rouse 1973). As roads and turnpike connections improved, wagons became the most popular method of overland transport. The region's major thoroughfares were busy places, filled with "jostling processions of freight wagons" (*Hagerstown Mail*, March 31, 1837). Along Appalachian turnpikes and roads, "wagons were so numerous that the leaders of one team had their noses in the box at the end of the next wagon" (*Harper's* 1879: 59).

THE ROLE OF TRANSPORT MIDDLEMEN

The expansion of external trade in southern Appalachia was characterized by economic restructuring. Producing the surplus commodities or constructing infrastructure is not enough to effect articulation with the

world economy. As part of the incorporation process, commodity transportation networks were organized to benefit distant trade centers; a new layer of nonproducing commodity distributors emerged to move goods between distant points. Their role was to activate linkages that mobilized capital between the urban core and rural hinterlands. Without these actors at the microlevel, the far-reaching commodity chains could not span the globe with exports and circle back again to deliver imports to the original exporting producers.

What enlivened the transition to capitalism was the creation of layers of markets that broke the direct connection between producers and buyers. It was exactly the problem of distribution between zones that led to the historical emergence of commission merchants: "Long chains of merchants took position between production and consumption" (Braudel 1977, 53). Globally and nationally, several layers of retailers, brokers, speculators, dealers, wholesalers, and forwarding agents emerged, by the 1830s, to offer ancillary services connected with marketing. To facilitate external trade, there emerged several types of commission merchants, wholesalers, retailers, intermediate processors, and shippers. At one level, these middlemen effected the exchanges between raw material suppliers or intermediate processors and the distant manufacturers who finished the products. At another level, commission merchants, wholesalers, and retailers constructed the extensive trade chains between food suppliers or manufacturers and distant consumers. For their "nonproductive" services in constructing commodity chains, these middlemen expropriated high profits (Bruchey 1972).

Consequently, antebellum trading from peripheral fringes was much more routine and accessible than most scholars have perceived. Appalachian producers could reach distant markets through linkages with several different types of middleman traders who warehoused commodities for export. For the region's largest surplus producers, the most significant link in the flow of external trade was the distant commission merchant who accepted Appalachian goods on consignment, made advances to the shipper on credit, obtained imports for the seller, and handled running accounts. Commission merchants based at distant urban trade centers advertised regularly in Appalachian newspapers. Rather than being isolated in a rural hinterland without interest in the outside world, Appalachian elites kept a running correspondence with commission houses at several northeastern and southeastern ports in order to keep abreast of the supply, demand, and price fluctuations in the world economy. When demand was high, distant commission merchants contacted their clients in the Appalachian countryside, soliciting shipments of flour, wheat, pork, or

cotton. By 1850, most of southern Appalachia's manufactured tobacco was being consigned to New York factors by way of Richmond or Norfolk houses. Distant commission merchants also marketed Appalachian salt, iron, copper, and coal (Dunaway 1996a).

In addition to consigning their commodities to commission merchants, Appalachian producers engaged in intermediate marketing strategies. Agricultural produce or livestock was exported to adjacent Appalachian counties from which the commodities would be resold farther away. For example, manufacturers marketed salt and iron in this fashion. From Wheeling, Frederick, Winchester, Staunton, Knoxville, and Chattanooga, livestock brokers reexported to distant cities the herds that had been driven from east Kentucky, West Virginia, western Maryland, and upper east Tennessee. For instance, east Kentucky mules were marketed to Knoxville dealers who fattened them for reexport to the Deep South (Dunaway 1996a).

EXTERNAL TRADE AND REGIONAL PERIPHERALIZATION

As capitalist incorporation deepened, regional productive processes and infrastructure were spatially reorganized to effect the articulation of rural Appalachian producers with distant consumer markets. Country merchants, hinterland villages, trading hubs, transportation networks, and distant metropolises were integrated into an interlocking web of exchange flows that absorbed most Appalachians within the pervasive reach of global commodity chains. The existence of so many nonproductive distributors and transporters is powerful evidence of the extent to which external trade had been systematized to the advantage of the core. The farther the production zone was from the consumption zone, the greater was the proliferation of layers of distribution agents involved in the commodity forwarding process, and each of those layers extracted surplus from the original producers. These marketing and distribution strategies maximized surplus extraction from peripheral fringes, like southern Appalachia, in order to centralize control over trade flows in those urban centers most tightly linked with European financial institutions. In this way, Appalachian capital (and that from similar peripheral fringes) accumulated at the core.

However, peripheral fringes are disadvantaged in another way. The economic dominance of the export sector encouraged the development of Appalachian commerce and towns at a pace that far outstripped the emergence of local manufacturing (Dunaway 1996a). In fact, the external trade

in several types of raw materials actually deterred the vertical diversification of local Appalachian economies. When commodities were exported in the raw forms to a distant destination, the receiving zone captured the trade's operating institutions and allied industries at the expense of the production zone and drained away the value added to the commodities through processing (Maizels 1992). For example, southern Appalachia never developed any extensive regional facilities for processing meat or copper prior to export. Instead, annual drives of livestock "on the hoof" and massive transfers of raw ore fueled meat packing in adjacent zones (like Louisville or Cincinnati) and stimulated the proliferation of allied copper industries in the Northeast and Europe.

Such horizontal integration further peripheralized Appalachian manufacturing and internal markets because it stimulated external trade in the reverse direction (Maizels 1992). Finished goods were bought from distant markets, even when such commodities might have been manufactured locally from available raw materials (e.g., shoes, fabrics). More significantly, technology for manufacturing and industry (e.g., mills) was imported from distant trade centers, as were many of the livestock breeds, foreign plants, and fertilizers that Appalachian farmers employed to increase their agricultural output (Dunaway 1996a).

After 1840, the terms of trade became more and more disadvantageous for Appalachian exports. Even though world prices for regional export commodities declined after 1840, the volume of imports steadily increased. By 1860, the region's economy had virtually stagnated. In addition to a declining trade position in the global economy, southern Appalachia experienced a one-sided pattern of development in which capital was primarily invested in land, slaves, and areas of export activity. Expansion of home markets was deterred by the focus on external trade in raw agricultural produce and extractive commodities, an economic orientation that also prevented the emergence of new industrial technology and diversified manufacturing. As a result, local Appalachian economies were "disarticulated" such that agrarian and commercial capitalism remained dominant, without stimulating the level of industrialization that was occurring in other sections of the country and in the European core. All these factors deepened the region's peripheral position within the world economy and exacerbated its polarization from other sections of the United States (Dunaway 1996a).

REGIONAL RESISTANCE TO SURPLUS EXTRACTION

Because of their domination of the region's external trade, commission middlemen drained off 10 to 15 percent of the surpluses that might have accrued to the original producers.² An even larger drain of regional capital was effected by speculators who originated from external metropolises. These middlemen bought up regional raw materials far below market prices, resold them for sizable profits, and drained away much of the external trade wealth that might have accumulated within southern Appalachia. Thus, global commodity chains operated as efficient and rationalized mechanisms for centralizing capital at the core — exactly because transport was so highly profitable.

From the perspective of peripheral Appalachian producers, however, the global distribution system was inefficient because of the capture of profits by middlemen. Consequently, Appalachian producers resisted core surplus extraction by marketing and transporting their own commodities. Farmers or merchants regularly advertised in newspapers to hire wagoners and boat hands (*Knoxville Standard*, March 31, 1846). Local companies operated "line teams" that specialized in long-distance hauling and freight (Rouse 1973). It was not unusual for larger farmers or merchants to operate their own line of wagons and to hire drivers on annual contracts. Larger planters and merchants often managed their own keelboats, canal boats, or packet boats — taking their neighbors' goods to market for a commission. For their monthly or bimonthly trading trips, larger merchants kept wagoners and flatboat pilots in their regular employ (Dunaway 1996a).

About twice a year, Appalachian merchants made regular trading trips to distant towns, exporting commodities and hauling back imported items for local retailing (Hilliard 1972). Appalachian manufacturers often disposed of their products by sending their own trade wagons to peddle their commodities in distant communities (Rouse 1973). An antebellum journalist observed that east Tennessee merchants "realize[d] a profit of 70% from almost every article" they wagoned to or from Baltimore and Philadelphia (Smith 1842: 54). Long-distance livestock drives formed one of the most significant mechanisms for the direct transport of Appalachian commodities to southern and eastern markets (Hilliard 1972). In 1860, southern Appalachia exported more than 1 million swine, nearly half a million cattle; more than 90,000 horses and mules; and thousands of chickens and turkeys (Dunaway 1996a).

CLASS STRUGGLE OVER TRANSPORT INFRASTRUCTURE

Despite this resistance, however, regional wealth was continually extracted. By 1860, southern Appalachian households were nearly twice as likely to be poor as families in the country as a whole. Between 1810 and 1860, there was growing internal polarization between Appalachian elites and the rest of the region's residents.³ Less than one-half of the region's households owned land or any other means of production, and one-quarter of these landless households formed the pool from which regional exporters drew their transport labor force. In the nineteenth century, transport systems were labor intensive, and commodity export was lucrative business (Phillips 1908). However, transport laborers earned the lowest wages of the period and experienced the most precarious living conditions (Soltow 1975).

Although the bottom mass of Appalachians were relatively impoverished, the top decile of families were monopolizing nearly three-quarters of the total regional wealth. Appalachian elites accrued part of their wealth by exploiting their neighbors through the commodity export process. For a large segment of the Appalachian farming community, participation in external trade came indirectly, because antebellum marketing was effected through "triangular trading" between producers, local merchants, and distant markets. Local merchants supplied the first layer of export-import linkages between the Appalachian countryside and the capitalist world economy. Typically, Appalachian merchants engaged in multiple enterprises, often operating mills, distilleries, or livestock stands, enterprises that warehoused local commodities for export (Dunaway 1996a). Country stores purchased their dry goods from distant eastern or southern cities, sending, in return, raw agricultural commodities. Quite often, Appalachian merchants vigorously encouraged farmers to cultivate local crops that were in demand at distant commission houses (Hilliard 1972).

By the 1820s, several major drover trails crisscrossed southern Appalachia, linking the border states to national markets. Following these routes, about 1,355,000 hogs; 100,600 cattle; and 86,870 horses and mules were herded annually to distant markets through southern Appalachian counties. These itinerant drives consumed about 5,672,186 bushels of Appalachian corn every year, and each Appalachian farm owner could dispose of 32 bushels of surplus corn in this manner. Consequently, more than one-fifth of the region's corn exports left the region "on the hoof," but the high profits accrued to elites who operated the

“livestock stands” where Appalachian producers marketed their surpluses (Dunaway 1996a).

Appalachian producers also could dispose of their surpluses by selling them to local speculators who purchased on credit from their neighbors extractive commodities, agricultural produce, or livestock. After contracting to accept certain amounts at specified below-market prices, these traders then exported to distant towns, accruing considerable profits. In addition to sales to the various types of middlemen, Appalachian farmers also marketed their raw agricultural produce to local manufacturers, who exported more profitable flour, meal, liquors, tobacco plugs or twists, meat provisions, leather products, and textiles. Because nearly 60 percent of the region’s manufacturing and extractive industries were fully or partially owned by absentees, surplus was extracted to benefit core capitalists and the local elites who represented them (Dunaway 1996a: 317).

Class struggle over transport infrastructure emerged as an outgrowth of this regional inequality between elites and the majority of Appalachians. Funding of waterway, turnpike, and railroad improvements reflected the export interests of Appalachian elites, not the needs of local residents for functional linkages to adjacent communities (Dunaway 1996a). Access to distant trade centers and the expansion of external trade were the primary motivations for public funding of antebellum internal improvements in southern Appalachia. River channeling, canals, bridges, ferries, and the construction of major state turnpikes or toll roads were justified by public officials as investments essential to commerce (Folmsbee 1939). State governments neglected streams or roads that were used predominantly by local travelers in favor of an infrastructure that would make extractive sites more accessible to trade routes or that would link Appalachian farmers and merchants to outside markets. As privately owned public monopolies, transport infrastructure opened those geographical locations where extractive industries, travel capitalism, and large export enterprises were being developed, leaving isolated those small farmers and poorer Appalachians who were less articulated with external trade. In short, transport systems came into being to speed the flow of commodities between distant markets and to facilitate the influx of tourists into the region’s 134 mineral spas (Dunaway 1996a).

Thus, the local interests of Appalachian counties were subordinated to the drives of the capitalist world economy. In the intense political rivalries with the richer nonmountainous sections of their home states, Appalachian elites aligned themselves with external planter-merchant aristocracies. The region’s economic dependence on richer zones was cemented, as local elites acted like a comprador bourgeoisie to syndicate

absentee investment capital for local enterprises. Consequently, the region's natural resources and industrial enterprises were heavily controlled by absentees, and its commerce was virtually in the hands of foreigners located in distant trade centers (Dunaway 1996a). The planter zones of the Appalachian states became dominant within the state legislatures (Ambler 1964), and they were relatively secure and resistant to challenges from the contradictory needs of those aspects of community life that were not oriented toward export to the world market. Throughout the latter two decades of the antebellum period, Appalachian counties were polarized within their state governments (Ashe 1925, Folmsbee 1939, Ambler 1964).

As a result, Appalachians steadily fell behind other Americans in wealth accumulation and in the development of transportation infrastructure. The sectional split over state funding of internal improvements was highly rancorous. Consistently, the state legislatures funded transportation projects in those counties dominated by the planters (Ambler 1964), and the Appalachian counties paid a higher proportion of taxes than their share of internal improvements (Folmsbee 1939). For instance, Tidewater politicians defeated western North Carolina bids for improved roads from the 1830s onward. "Nature has supplied us with the means of reaching a good market," they objected to the western representatives, "and we will not be taxed for your benefit" (Ashe 1925: 324). Similarly, east Tennesseans saw themselves as "mere supplicants at the gate of the Nashville temple" where the legislature was under the control of the "Middle Tennessee aristocracy" (*Jonesborough Whig*, December 8, 1841). By the late 1830s, the state had subscribed \$277,000 for turnpike construction, all in the planter-dominated counties of middle and west Tennessee (Folmsbee 1939).

In every Appalachian state, the sectional rivalry over internal improvements resulted in the funding of roads, canals, river channeling, and railroads that benefited non-Appalachian counties. By 1860, there were ten miles of railroad for every 10,000 residents in the United States, but railroads were developing only half that fast in southern Appalachia. Although railroad construction in the non-Appalachian counties of their home states surpassed national averages, Appalachian counties received less than one-half mile of track for every mile laid in the planter-dominated areas (Dunaway 1996a).

Except for connections into a few Appalachian counties of Maryland, Virginia, and West Virginia, most of southern Appalachia lacked railroad service during the antebellum period. By 1855, railroads had developed in 53 of the region's counties, linking the region even more firmly to distant

coastal entrepôts (Phillips 1908). However, this new phase of internal improvements did not open up the most isolated sectors of southern Appalachia. Following established trade patterns, railroads were constructed in counties that already had major river and turnpike connections, leaving 39 of the Appalachian counties with no outside linkages except ill-kept county roads (Dunaway 1996a).

DEEPENING PERIPHERALIZATION AND TRANSPORT LAG

Between 1815 and 1850, there was a global contraction in world trade (Agnew 1987). By the latter part of this downward cycle, the U.S. Northeast had risen to core status in the world-system, pulling the plantation South into the semiperipheral level (Wallerstein 1989). There are two mechanisms by which a capitalist economy can grow and expand: reduce costs or eliminate competitors. However, southern Appalachia held no monopolistic control over production of any of the commodities it exported. Consequently, three factors had, by 1860, eroded the competitive position of southern Appalachia in the world economy. First, national and global prices declined for the major agricultural and extractive commodities exported from the region. Second, grain and livestock exports became "redundant" in the Southern trade centers where they were sold, resulting in lowered prices (Lindstrom 1970). Third, excluding Appalachian production, the South and Southwest generated enough food crops to meet their own internal needs; thus, Appalachian exports were heavily dependent upon the demand for reexports to the industrial Northeast, to distant international plantation economies, and to the European core.

As the world-system and the United States incorporated new arenas, there were periodic global oversupplies of most of the commodities marketed by Appalachians. Finally, lack of access to railroads weakened the region's trade position after 1845. Because other regions of the United States improved their transportation infrastructure faster than Appalachian counties, external demand for the region's commodities declined. As the railroads advanced more rapidly into the Midwest, southern Appalachia fell further and further behind in infrastructure to support external trade. Moreover, the flow of western livestock and agricultural produce into eastern and southern markets generated competition for Appalachian commodities. As the European core and the U.S. Northeast shifted to supply zones with more efficient transport mechanisms, southern Appalachia entered a long economic downswing (Dunaway 1996a).

NOTES

1. For a map of these rivers and canals, see Wilma Dunaway (1996a: 210).
2. "Transportation surcharges" and "commission fees" for such middlemen appear frequently in the account books and journals of Appalachian stores, manufacturers, and farmers. See also Ulrich Phillips (1908) and Erik Haites and James Mak (1970).
3. In the half-century between 1810 and 1860, inequality in the ownership of wealth remained relatively constant throughout the rest of the United States (Soltow 1975).

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7

Raw Materials Transport and Regional Underdevelopment: Upper Michigan's Copper Country

Jonathan Leitner

Michigan's Upper Peninsula (UP) is a poor rural region, one of the United States' "forgotten places" (Lyson & Falk 1993). A recent study of one of its 15 counties, which is also part of the three-county "Copper Country" in the western UP, showed how it and the UP as a whole lag behind the still heavily industrialized lower peninsula in many key social and economic indicators (Schwarzweiler & Lean 1993). Yet, at one point, the UP's copper mining district of Houghton, Keweenaw, and Ontonagon counties was one of the most industrialized and economically vibrant regions of the state, with a growing population — this growth occurring even after the area was no longer the dominant U.S. copper-producing region (Lankton 1991: 3–109; Thurner 1994: 88–122, 158–191).

Despite being a major source of raw materials for the core regions of the United States for many decades, once the copper was effectively depleted, there was not very much for the copper country's economy to fall back on. Why not? It is a basic tenet of world-systems analysis that peripheral, raw material supply regions will end up little better, and often worse, than the way they were before becoming extractive areas. World-systems analysts posit that such outcomes are built into the structure of the system, though this does not preclude mobility within a world-systemic hierarchy. However, such mobility well may be a moot point for regions within a nation-state, which cannot legally employ tariff barriers and other means to promote import-substituting industrialization, one oft-employed

means for achieving core status (Salstrom 1994). Specific to this case, the author of the copper country's definitive economic history suggests that there was at least some indirect pressure on the part of the mining industry to keep out manufacturing (at least noncopper related), in order to maintain a low-wage labor market, keep out unionism, and keep control of land that eventually might have mineral value (Gates 1951: 168–169).

Yet, beyond the *prima facie* political economics, or, rather, in articulation with them, are the physical facts of the resources being extracted and the spaces across which they are moved. William Gates (1951: 168) also argues that “[m]anufacturing possibilities were not particularly bright in consequence of great distance from dense centers of population, high fuel costs, and long winters,” factors that also hampered agricultural development and its emergence as an independent sector (Mahaffey 1978: 97–155; Whitaker 1926). Before the Mackinac Bridge linking the two peninsulas was completed in 1957 (Binder 1995), a regional historian asserted that the UP's “commercial outlets” were actually in Chicago, Milwaukee, and Minneapolis, the latter two only 300–350 miles away, rather than Detroit, about 550 miles away (Chase 1936: 313; Dunbar 1969: 119; Lankton 1991: 3–4). In fact, the western parts of the UP are farther from Detroit than Detroit is from New York or Washington, and remoteness continues to play a constraining role in attempts to diversify the region's economy (Schwarzeweller & Lean 1993: 176).

The region's remoteness, thus, gave transport capital an even greater role in determining the region's economic history, which, before the discovery of any potentially valuable raw materials, was considered rather useless by much of Michigan's citizenry (Mahaffey 1978: 354). The UP had been awarded to Michigan in the 1830s as consolation for losing a territorial dispute with Ohio. The Michigan state government's subsequent attempts to gauge the value of the UP led to the discovery of major copper and iron deposits in the mid-1840s (Krause 1992; Thurner 1994: 35–62). These discoveries motivated improving transport access to the UP, because the peninsula's (potential) value to the state was, thus, confirmed (Dunbar 1969: 116–118). Old-school development theory would posit that improved transportation infrastructure is one of the key linkages in resource extraction, enabling further development beyond extraction itself. As one scholar put it: “[t]heory and history suggest that the most important example of backward linkage is the building of transport systems for collection of the staple, for that can have further and powerful spread effects” (Watkins 1963: 145).

Yet, writing toward the end of the UP's major extractive period, Lew Chase (1936: 324) could assert that, once a given mine was abandoned or

timber stripped from a region, the "railroad lines and water facilities [involved in extraction] have also been abandoned." In his works on the two main railroads that traversed the copper country, local historian Clarence Monette (1989, 1993) corroborates Chase's assertion: their primary *raison d'être* was movement of raw material, and with (effective) depletion, they were phased out of corporate existence. Yet, transport was still key to the UP's incorporation, because without it, the costs of extraction would have been prohibitive. With fur largely played out, bulky, lower values per volume timber and minerals were the main staples Euroamericans wished to extract once the U.S. federal government took possession from the indigenous population.

However, although a necessary requirement for incorporation, particularly at the agent level of individual capitalist firms, improved and expanded transport infrastructure does not always hold unadulterated benefits for the populations that are faced with sudden penetration by capitalist enterprise or, more germane to this case, migrate along with capital. For a remote region like the UP, any sort of improved transport infrastructure would seem a blessing, but it appears that it also enabled more rapid extraction of the largely nonrenewable resources that provided most of the region's economic base. Following from this, the copper country and the UP more generally did not experience positive outcomes from improved transport infrastructural connections to the core. According to one scholar of the upper Great Lakes' extractive political economy: "The peculiarity . . . was that the spiral of economic growth never progressed very far. This was due primarily to the fragility of the economic infrastructure and to the region's economic dependence on only a few external economic links, making the region vulnerable to exogenously induced shocks . . . most major decisions had their origin outside the region" (Mahaffey 1978: 9). He further suggests that the transport links were too good, and that industrialization did not occur because "raw materials could be moved to the heartland inexpensively" (Mahaffey 1978: 52). World-systems studies going back to Immanuel Wallerstein's first volume (1974) at least implicitly recognize that effective transport routes are the main way for core and periphery to be physically tied (also, Hugill 1993), with the resources and excess labor of newly incorporated regions more readily available to core exploitation (e.g., Hanna 1995; Valerio 1993). Recent work on extractive economies (e.g., Barham, Bunker, & O'Hearn 1994) points out that this is most likely in extremely remote areas, particularly those "opened up" for the expressed purpose of resource extraction. Less recently, but still appropriate, Harold Innis's work (1956) on Canadian extractive regions also implies that, beyond any explicit

intentionality on the part of capital, the physical characteristics of the resources being extracted place certain “deep structural” constraints on the economic future of an extractive region. In other words, certain natural resources do not promote transport-induced linkages to other economic activities, regardless of the agency of either capital, labor, or the state to attempt so. In Stephen Bunker’s (1992: 61) words, “the physical characteristics of some economic processes allow far more social manipulation of time and space than do others.” Specific to much mining activity, excessive bulk exacerbates the “tyranny of distance” (Blainey 1968) by driving transport costs up beyond levels of profitability for any other activities. The expense of getting bulky capital goods into, and often bulky extracted resources out of, an isolated region means that those transport systems going into said regions often are dedicated to moving out a single commodity (Bunker 1992: 68) — and though there might be local processing if reducing bulk locally helps reduce transport costs, there likely will be limited linkages and “spread effects” into other economic activities. Even somewhat more optimistic theories of mining-based local economic development, which take more positive views of the role of resource transport infrastructure, nevertheless also recognize that there is still a dependence on the imperatives of extractive capital, for example, Homer Aschmann’s (1970: 185) supplication: “It does not seem unreasonable for the society to request that this transportation facility be routed in such a way as to support regional economic development in other directions, if such routing carries only a modestly greater cost than the cheapest one to serve the mine’s immediate needs.” Yet, extractive capital’s “cut and run” imperative often is instead exacerbated by geography and the physical characteristics of the raw materials in question. Further, it is as likely that transport capital’s particular imperatives are the determining factor in whether or not an extractive region “develops” any economic activities beyond extraction or very rudimentary processing or very close linkages to the extractive process itself.

To more narrowly rephrase the question about the copper country’s experience, how do the imperatives of transport capital versus those of extractive and transformative fractions of capital help us understand regional economic change, particularly when the outcome is a “staple trap”? Can we somehow specifically link the copper country’s fate of depleted dependence to the factor of transport? In the next section, I try to articulate a theory of transport and underdevelopment based on struggles over freight rates. The rest of the chapter examines the struggles over freight rates for UP copper in light of the theory.

EXTRACTIVE REGIONAL CHANGE AND THE POLITICAL ECONOMY OF FREIGHT RATES

Although examining a region far removed from the UP, Ackson Kanduzo (1986: 6) argues that studying the political economy of railway rates and rate making allows us to see "how international capital operated on a regional scale to ensure a monopoly over the conveyance of the most remunerative traffic." Further, T. D. Regehr (1977: 133) points out that "rate-making is a very serious obstacle to any economic diversification or industrialization in regions which lack effective transportation competition and therefore suffer from high and discriminatory freight rates." As well, although Regehr is talking about primary producers wanting to ship their output to secondary processing centers, the establishment of secondary processing centers also has been hindered by higher freight rates being placed on manufactured products than on raw materials (Pred 1965: 172). More generally, Bunker (1994a, 1994b) has argued that underdevelopment in resource-exporting regions largely results from the fact that transport costs often are shouldered by the exporting economy, lowering the cost of the raw material to the importer and, hence, lowering the terms of trade.

Kanduzo's (1986) view of rail and the importance of transportation in capitalist production is based on Karl Marx's discussion in volume 2 of *Capital* (1967). Marx saw transportation as an industrial activity because it added value to a commodity (MacDonald 1975: 268). Transport was, thus, subject to the constraints and imperatives of industrial capital in general (see Harvey 1982: 376–380). However, Marx included the proviso that "[t]he useful effect can be consumed only during this process of production." In other words, the value of transport is only in the "change of location" transport capital provides its customers: "It does exist as a utility different from this process, a use-thing which does not function as an article of commerce, does not circulate as a commodity, until after it has been produced" (Marx 1967: 54). He also argued that this transport value-added was most important for things whose "consumption may necessitate a change of location," thus, requiring the productive processes of the transport industry (Marx 1967: 153). Again, remote raw materials are valuable only if they can be moved to where it is economical to process them (or, conversely, transport the fuel used in processing to the point of extraction, whichever is cheaper — granted those are two points on a continuum [see Weber 1929]). Hence, transportation, though a productive process, also occurs "within the process of circulation and for the process of circulation" (Marx 1967: 155). This means that, at the very

least, transport capital likely will have different interests than more “fixed” forms of industrial capital, whether extractive or transformative (though transport industry itself requires extensive fixed capital [see Harvey 1982: 378]). To further complicate matters, there are different types of transport, and those capitalists involved have different interests, based on the imperatives of their particular mode of transport.

Granted, in the copper country, capital was externally controlled in virtually all aspects of the industry (Gates 1951; Hyde 1984). Nonetheless, struggles over freight rates can help illustrate the constraints that any attempts to establish major secondary processing were under and would, perhaps, still have been under even if there were more autonomously controlled local capital in the area that desired more local diversification. Understanding this situation first requires a look at the region’s development in the period leading up to the specific freight rate struggles examined, which helped establish their underlying dynamic.

THE COPPER COUNTRY’S POSITION IN THE NINETEENTH-CENTURY WORLD ECONOMY

Acquisition of Michigan’s UP by the United States came at a key time in the development of the world economy. The British were starting to move toward a freer trade regime in the 1840s (McMichael 1985: 129–131), and the changing tariff policies that went along with it opened up space in the periphery and semiperiphery for copper processing, which formerly had been monopolized by the Swansea works in Wales (Roberts 1969; Newell 1990). One of these areas that benefited was the East Coast of the United States, which saw smelter works start up in Boston and Baltimore primarily to take advantage of the Latin American copper that suddenly was not able to penetrate the British market because of a quirk of the navigation laws. The existence of large deposits of copper in upper Michigan would seem to be fortuitous in these circumstances, with new smelters now opening within the borders of the United States itself. However, the Michigan variety was “native” copper, a geological oddity that played some havoc with attempts to process it. The experience with native copper had an impact on the U.S. copper processing industry over the next several decades, within which the UP’s copper country would play a major role (see Leitner 1996).

Native copper is pure, chemically uncombined copper (Pennebaker 1954: 21–23). In that sense, it is not truly an ore, though it did have to be physically separated from the gangue, or rock in which it was encased, the same as more common ores. At that level of purity, smelting is a much

less complex process than with the more common sulfide or oxide ores (Butler & Burbank 1929: 101). Further refining past the smelting stage was not even a requirement, a fact that "had much to do with making the refining of copper a separately organized stage in the industry," because no other ores could produce copper as pure as the Lake Superior product from mere smelting in the period before electrolytic processing (Skelton 1937: 376).

These basic physical characteristics of native copper would play a major role in determining the economic geography of U.S. copper processing over the next several decades (Leitner 1996). Initially, East Coast smelters founded to process Chilean and Cuban ores in the wake of British tariff adjustments also processed the copper country's native metal (also known as "Lake copper"). However, these operations never handled more than 10 percent of the copper country's output (Egleston 1886: 360). As I discuss in another work (Leitner 1996), various technical difficulties, combined with both higher processing costs and (obviously) higher transport costs for the Michigan mining companies, led to the end of most Michigan native copper smelting on the East Coast within a few years. By the late 1840s, copper country mining firms were investing in smelters closer to the mines, in Pittsburgh, Cleveland, and Detroit, at least partially aided by East Coast manufacturing interests and, in fact, were able to process Lake copper at a considerable savings over what the East Coast works had charged (Cooper 1901: 44–45; Chaput 1971: 65; Egleston 1881: 680; Gates 1951: 28).

In 1860, the first successful smelter in the copper country itself opened, and by 1866, more than half of the mines' product was being smelted locally, with the rest handled by works in Cleveland, Detroit, and Pittsburgh (Cooper 1901: 46; Gates 1951: 28–29). This was not initially practicable for the majority of mines, many of which were too far from "suitable mill sites" (Lankton 1991: 54), though, according to Gates, it eventually became "most economical" to smelt most of the copper near the mines in the copper country itself. The local rail network originated with mining firms and independent investors that had begun setting up variously gauged rail lines throughout the copper country in 1864. By the early 1880s, there was enough of a local rail network for significant smelting to occur in the copper country, along with the connection to the larger national rail net (Lankton 1991: 54; Gates 1951: 60–62). Yet, the late 1860s still saw a high percentage of Lake copper being sent to the lower lakes for smelting because of high labor and coal costs and a lack of adequate land transport within the region itself (Gates 1951: 29; Haller 1931: 515).

Although it may have been initially cheaper to take advantage of economical water transport and send the raw copper down to the lower lakes for smelting, this was not easily accomplished before construction of the Sault Ste. Marie Canal, where the St. Marys Falls had caused "the worst link in the transportation system" (Gates 1951: 18). Ironically, what local smelting there was had itself been greatly enabled by the construction and 1855 opening of the canal at Sault Ste. Marie, which connected Lakes Huron and Superior (Neu 1953; Dickinson 1981). The canal was built by private interests that used their federal government land grant to speculate in mineral lands (Neu 1969; Laurent 1983: 8), a direct material interest that we should expect, given that extractive activities were the major economic attraction of the region at the time. Indeed, that is very much part of the larger theoretical point: the canal enabled the extractive development of the region, albeit regardless of any one firm's particular interest, because both the U.S. government and especially the state of Michigan planned on seeing it built one way or another (Dickinson 1981: 5–30), either via private companies chartered to do so or undertaking the tasks at direct public expense.

Prior to the canal's opening, even just getting to and from the Keweenaw peninsula was a difficult and expensive proposition: cargoes had to be unloaded, portaged, and reloaded, with boats on the Superior side charging essentially monopolistic prices because of their small number, a consequence of the difficulty of getting them up there in the first place (Hybels 1950; Gates 1951: 18–19; Clarke 1853: 439–440). The difficulty and expense also held for individual persons, let alone the bulk cargoes that industrialized mining methods required, methods more necessary even in the early period of the Michigan copper country than in the concurrent California gold rush (Hybels 1950: 313; Lankton 1991: 8–9; compare with Paul 1947; more generally, Aschmann 1970).

The canal's existence appears to have allowed coal shipments just in time to make up for depleting local timber supplies, with coal actually both cheaper than wood and as effective a fuel (Gates 1951: 27–28). Of course transporting the raw material also was cheaper, especially to the "western" smelters (Gates 1951: 19; Whiteman 1971: 182; Egleston 1881: 684). More locally, Gates (1951: 19) points out that the Portage Lake Canal across the Keweenaw peninsula itself was dredged in 1862 and then completed in 1873 (Monette 1980), enabling much cheaper direct shipment of copper and copper mineral from the copper country to lower lake ports (Cleveland, Detroit, and Chicago). Further, the canal "made Houghton and Hancock ports of call for almost all of the Upper

Lake traffic" (Gates 1951: 61), because ships now could avoid the often dangerous trip all the way around the Keweenaw peninsula..

By the early 1880s, the main Lake copper processing firm had smelters at Hancock, Michigan (in the copper country itself) and in Detroit, with the Hancock smelter eventually taking precedence over the Detroit site. This was because of transport costs, despite the fact that the Detroit site had lower smelting costs — according to Gates (1951: 43), "[i]t was clearly better to use the furnaces at Hancock and ship pure ingot eastward than to ship mineral of 75 per cent copper content to the Detroit works." Yet, contemporary mining expert Thomas Egleston asserted in 1880 that transport costs between Hancock, up on the Keweenaw peninsula, and Detroit did not make that much difference. Smelting in Detroit had the advantage of flux and coal "near at hand," but the copper still had to be shipped down from the copper country — further, this was limited to the six months out of the year when navigation was ice-free (at the time he was writing, the copper country still lacked an outside rail connection) (Egleston 1881). Hancock and vicinity had the converse problem, with flux and fuel having to be shipped in the opposite direction. According to Egleston (1881: 683), then, "it would seem that Hancock would have the advantage, since it is so near the supply of ore; but at Detroit the principal part of the expenses not in common to both places is the freight on the mineral, part of which would in any case have to be borne by the copper if produced at Hancock. [However], the amount of crude material which is not copper, carried to Detroit, is comparatively small, so that it is actually cheaper to smelt at Detroit than at Hancock." This situation illustrated the basic problematics of Weberian economic geography: "should smelting and refining take place close to the mines, or to sources of fuel or to markets?" (Harvey & Press 1990: 6; also Weber 1929; Isard 1948).

Such "deep structural" problematics have agent-level consequences, in that the basic question about where to process the ore did not necessarily have a clear-cut answer. The result was the class-fractional political struggles over freight rates posited above. These struggles had a great deal to do with the particular mode of transport and also were indicative of different regional economic interests between core and peripheral regions within the United States.

RAW MATERIALS TRANSPORT BETWEEN CORE AND INTERNAL PERIPHERIES IN THE UNITED STATES

Although shipping via the lakes remained the key mode of transporting Michigan copper (and coal for operations in the copper country), the railroads did gain in importance, and the differences between the two modes resulted in much contention between extractive and transport sectors of capital. Specific to much of U.S. history, particularly the period examined here, water and rails were fierce competitors (Cronon 1991: 55–93; Kennedy 1991: 148–149). Water transport preceded the railroads, particularly via extensive inland canal systems (Shaw 1990), “which the railroads recast in their proper role as carriers of nonperishable bulk commodities,” because railroads moved faster than canal boats (Hugill 1993: 176–177) and were not constrained by winter weather. Yet, for those bulky nonperishables, water and rail still could compete, which, in terms of regional development, was probably a good thing, because small shippers in North America generally have had ruinous historical experiences with transport monopolies (e.g., Regehr 1977; Magliari 1989).

Despite all the problems experienced between small shippers and transport capital, larger shippers got along much better with transportation companies, as Robert Kennedy (1991: 159) notes with rail: “large shippers, also the major accumulators of the era [1885–1919], received discounts, rebates, and special services, [while] small shippers did not.” Railroad capital’s structural imperative for high-bulk commodities led to monopolization within other industries (e.g., oil, tobacco, meat cutting, lumber) in order to receive more favorable rates (Kennedy 1991: 160), as well as many railroads’ vertical integration via outright purchase of their clients in order to ensure utilization of rolling stock (Kennedy 1991: 148–149; also Whitten 1983: 153–167).

Rail’s general triumph redounded well for the U.S. federal state’s future standing in the world economy, as well as those core regions within it that engaged in resource processing (Bunker & Ciccantell 1995: 112). However, as Christopher Chase-Dunn (1980) and Richard Bense (1984), among others, have shown, this outcome involved a great deal of contention between regional political-economic interests. According to Gerald Berk (1994) these regional struggles had much to do with railroad policy. Berk explicitly critiques Alfred Chandler’s work, arguing that the initial economic bases for the imperatives with which railroad capital had to deal were as much politically constructed as “purely” economically determined, that is, the larger factors of technology and markets had been

themselves predetermined by the politics of capital markets in the post-bellum United States (see also Bensel 1990). Berk argues that the big rail shippers' imperative for high-volume, interregional through traffic was attained through a partial compromise between their desired "corporate liberal" imperatives of national, transcontinental system building based on dominant central cities (i.e., a core strategy, described by Berk as involving "economies of scale") and the "regional republican" imperatives of smaller, regionally based systems in its rail freight policy decisions (a more periphery-favorable strategy Berk compares with "economies of scope"). This entailed "regulated competition" under the Interstate Commerce Commission (ICC): that is, railroads were allowed to set their own rates as long as "the regionalist's claim to parity" was still being met (Berk 1994: 104).

What did this mean for UP copper producers? According to Berk (1994: 105), the concept of regulated competition was basically dropped in cases "when regulated carriers [i.e., the railroads] faced competition from unregulated transportation — foreign railroads or water carriers," in which cases rates essentially could be set by the railroad without interference. The copper firms of upper Michigan shipped relatively high-bulk, nonperishable resources in quantity, but this did not guarantee entirely cordial relations with transport firms, whether lake shippers or railroads. The latter became more important as time went on, being less subject to "the seasonal fluctuations which characterize dependence on water transport" (Innis 1956: 74). Yet, water transport still provided some important competition to rail transport, as this case demonstrates. It also demonstrates that the ICC was fully willing to let railroads set their own rates when faced with water competition, which led to rather disproportionate seasonal differentials.

COPPER TRANSPORT ON THE GREAT LAKES: STAPLE, STRUCTURE, AND STRUGGLE

Water transport obviously faced seasonal constraints, with fall rates higher than those over the summer because of weather risks (Gates 1951: 20), and the virtually complete shutdown during the iced-over winter months. Not until late 1883 was transport into and out of the copper country available by all-rail means (Haller 1931: 515; Benedict 1952: 162). Yet, water transport retained its importance as a seasonal competitor with rail transport. The supposed cheapness of water transport as compared with rail was challenged by the *Engineering and Mining Journal* in a 1906 editorial (*Engineering and Mining Journal* [hereafter *EMJ*] 1906) that

asserted that the infrastructural costs involved in establishing and maintaining waterways was "borne by the taxpayers and . . . not paid as part of that freight charge like the railway rate." Granted, this was a reasonable point in light of the investments that went into both the Soo Locks and the Portage Lake Canals, but the mere fact that water transport on the Great Lakes was an option for at least part of the year played a major role in the determination of freight rates between the copper country (and other extractive regions on the upper Great Lakes) and the continent's transformative-industrial core. The actual cases of how the seasonal factor was used by the state to justify railroad freight differentials gives some insight into the workings of core-periphery relations within the United States.

The issue of freight rates also had much to do with the physical characteristics of copper and the differences between its varieties. Just before several administrative lawsuits over copper freight differentials, W. R. Ingalls (1912) described how copper itself was marketed in four main varieties: "Lake," the native copper from the Michigan copper country; electrolytically processed; pig; and ingot. Lake and electrolytic copper made up the overwhelming majority of U.S. production, with electrolytic alone taking up some 80 percent of the total (Ingalls 1912: 888), a mark of how far and fast Michigan's national hegemony had fallen (see Leitner 1996) and a genuine mark of the quality of the output from electrolytic smelters, which could produce copper as pure as the Lake variety (Eichrodt & Schloen 1954). Again, processing Lake copper was a relatively simple matter of melting, also known as "furnace refined" because lack of impurities obviated any further steps beyond simple melting (Egleston 1881; *EMJ* 1908a, 1908b; Conant 1911). According to Ingalls' (1912: 888) report, Lake copper was refined near the mine itself then sent on to be manufactured. A major exception was the Calumet & Hecla Company (C&H), by this time the "Saudi Arabia" of the Michigan copper country. The C&H was shipping some of its more argentiferous (silver-containing) produce to an electrolytic refinery at Buffalo, using its own "small fleet of vessels," which also backhauled coal to the copper country (Gates 1951: 73). C&H also served as a selling agent for several of the smaller copper country producers, mainly those in which it also held stock (Ingalls 1912: 888).

Ingalls (1912: 939) pointed out that most Lake copper was sold directly to the secondary processing manufacturers who required it for a raw material. There were a number of arrangements that marked the sale and delivery of Lake copper. Certain producers followed the New York City price quotations but added or deducted the freight differential between the shipping point and New York: "Thus, in selling copper for delivery at

Buffalo, some producers name their New York price and deduct the difference in freight between Michigan–New York and Michigan–Buffalo” (Ingalls 1912: 939). Other producers included delivery to the manufacturer in their named price itself, at least some of the time allowing 30 days for payment. Producers that sold to both brokers and manufacturers would allow the manufacturers to cut the price paid by the same amount allowed to the broker.

The practice of allowing 30 days payment time after delivery was likely a result of competition between emergent electrolytic copper and Lake copper. According to Ingalls (1912: 889), this probably started in the 1890s, with increased competition between the two forms (see Leitner 1996). Lake copper had the advantage in delivering its produce “directly” to manufacturers, while the electrolytic copper had to come from the far west, via New York, at least before the development of local electrolytic smelters, particularly in the Butte district of Montana (Leitner 1996). To overcome this advantage of Lake producers, the new electrolytic firms, “inspired doubtless by competitive reasons,” decided it would be good business to “offer [their product] to the manufacturer on terms that relieved him of a study of freight rates” — in other words, no payment required for 30 days, with a discount for cash (Ingalls 1912: 889).

Because New York City was the primary market for the commodity in the United States, it served as the basing point for the price, with three major New Jersey refineries operating just across the Hudson. Although the East Coast had regained its pre-1869 stature in U.S. copper manufacturing, there were “important isolated centers,” among them Trenton, New Jersey; Rome, New York; and Detroit. According to Ingalls (1912: 889), the refined copper shipped back west had to pay “back freight through the longitude . . . it [had] already traversed in coming eastward as blister copper.” Electrolytically refined copper from the far west (Tacoma, Washington, and Great Falls, Montana) and Lake copper from upper Michigan managed to avoid this. At least in the case of Lake copper, when shipping to western (i.e., non–East Coast) manufacturers, the Lake producers would “settle on the basis of the New York price with freight allowance” (Ingalls 1912: 889), thus, providing Lake firms (which included those in the Midwest that processed Lake copper) an advantage.

The main problem for Lake firms, which mostly were selling direct to manufacturers, was the divergent freight rates they had to pay, depending on the means of transport: to get Lake copper from Michigan to Connecticut, going all-rail cost 34 cents per 100 pounds, while a combined water-and-rail route cost 18 cents per 100 pounds. Ingalls (1912: 939) characterized this situation as “embarrass[ing]” to Lake producers, who

were then vulnerable “to the operations of shrewd outside speculators” around both the opening and closing of water navigation. Indeed, more than a decade previously, the *Engineering and Mining Journal* (1899: 315) charged that Lake copper was “in fact, now a speculative brand” though, because of its limited production that was virtually monopolized by one firm (the C&H), as opposed to the more diverse (hence, more “stable”) sources of electrolytic copper, rather than the seasonal fluctuations in freight rates. At the time, according to Ingalls (1912: 940), “Speculation in the copper business in [the United States] [was] severely discouraged, for the simple reason that the producers and agencies [were] primarily concerned with the merchandising of copper. They [could not] regulate the European market in this way and [were] obliged to meet conditions over there as they [found] them, but in this country they [could] and [did] refuse to sell to any but manufacturing interests.”

However, the high freight charges entailed by the constraints on cheaper water transport during the winter months were at least as important in driving the price up, at least temporarily (*EMJ* 1900: 373). In 1900, the journal had, in fact, decided to switch over to electrolytic copper for its standard price quotations, being “the safer and more natural standard of prices on which to base contracts for the purchase or sale of ores or furnace material. . . . Electrolytic copper has also the more stable value, and is less liable to fluctuations than the smaller quantity of lake” (*EMJ* 1900: 372). Not just expected factors of depletion and loss of purity (*EMJ* 1900: 373; more generally, Aschmann 1970) but also remoteness and physical location were beginning to cause the copper country’s product to lose its standing in the market.

Michigan producers did not go down without a fight, however. In October 1912, two Detroit-based copper manufacturers filed a formal complaint with the ICC (Interstate Commerce Commission [hereafter ICC] 1913a), alleging discrimination by the railroads that carried their raw material from the copper country to their factories. The two firms charged that the railroads carrying their product were charging them with rates too high relative to their (mostly) East Coast-based competition, who were only charged three cents more per 100 pounds for shipments to New York City (35.5 cents versus 32.5 cents) (ICC 1913a: 357). The ICC ruled that this was a discriminatory situation and that the differential should be boosted to at least 10 cents but that the Detroit rate should stay the same.

Although the two plaintiff firms obviously were not based in the copper country itself, they were processing the raw material extracted there, and the ICC’s ruling sheds further light on the difficulties that would face any attempts to develop the copper country beyond basic processing. Key

among these was the fact that the region's remoteness was most cheaply overcome by water transport; as well, this was perhaps the key reason for the ICC's decision in this case. Although the plaintiffs actually received less than half their raw material from the copper country (ICC 1913a: 358), much of what they did receive from the region was via the April-November "rail-and-water" or "lake-and-rail" routes, in which Detroit purchasers actually enjoyed a ten cent differential over New York purchasers (8 cents versus 18 cents per 100 pounds) (ICC 1913a: 359-361). Yet, the case was just concerned with rail-only transport of copper, which was "limited to the season during which navigation is closed on the great lakes, December 1 to March 31" (ICC 1913a: 359), though the exact dates varied from year to year. Again, though a minority of its raw material came via all-rail from the UP, the ICC saw the differential as a genuine handicap to the Detroit firms or, perhaps instead, an unfair advantage to East Coast firms paying relatively less, albeit 3 cents more absolutely. The ICC's reasoning was based on the fact that the copper country was connected with major rail carriers via the short lines of the Mineral Range Railroad and Copper Range Railroad (see Monette 1989, 1993), which ran 182 miles and 153 miles respectively before reaching their two parent lines and the continental rail net (see Barnett 1986). Specifically, the ICC (1913a: 363) argued that the

Three originating carriers [they included one of the parent lines along with the short lines] operate in a sparsely settled territory . . . [in which] climatic conditions are extremely unfavorable during the winter months and the general result of operation has fallen below an acceptable rate of return. Copper is a high-priced, valuable commodity, which on the basis of long-established and well-recognized principles of rate making, should bear a rate corresponding to its proper place in a classification of commodities. Both on account of the relative lack of financial prosperity of the initial carriers and the ability of copper to bear the rate, we can not, under the present conditions, find the rate under attack unreasonable in itself.

Again, this meant that the rate to New York would be raised while the rate to Detroit would stay the same (*EMJ* 1913a).

Despite what appears a minor victory, the *Engineering and Mining Journal* (1913a) commented that the ruling would not change the conditions of the Midwestern markets. Lake copper would still compete with the western electrolytic product, while the eastern electrolytic, refined around New York City, was "too uneconomical to pay the back-freight on . . . if it be sold in Detroit, Chicago, etc." Although the journal was

sanguine with respect to the reaction of customers with a more inelastic demand for Lake copper, it argued that the coming freight rate increases “would tend to divert customers to electrolytic, and probably the increment in freight rates will have to come out of the pockets of the sellers” (*EMJ* 1913a: 34). Nevertheless, the important point for the copper country itself was that it was still likely too expensive to do anything other than ship raw material out of the region.

Soon after, a copper country manufacturing firm experienced a contrary ruling by the ICC. In November 1912, the American Insulated Wire & Cable Co. sued the Chicago & Northwestern Railway Co., along with several others. At issue was the railroads’ charges of seven cents more per 100 pounds of freight from the firm’s factory to Chicago when water navigation was closed off (22 cents per 100 pounds) than when the water route was open (15 cents per 100 pounds) (ICC 1913b; *EMJ* 1913b). The ICC (1913b: 416) found the differential “not in itself unlawful.” The seasonal factor again came into effect in this decision, even more strongly than in the prior one, because the ICC found it not “unreasonable” to charge higher rates when the lakes were closed. American Insulated Wire had reasoned the opposite: that the lower rates were a result of water transport’s availability eight months out of the year, and merely because the Great Lakes happened to be frozen four months out of the year, “it [was] unlawful to charge a higher rate to the same competitive point,” so that, if a railroad competing with a water carrier reduced its freight rates for purposes of competition, the railroad was then not allowed to hike its rates back up “unless . . . such proposed increase rest[ed] upon changed conditions other than the elimination of water competition” (ICC 1913b: 416). Again, the ICC (1913b) did not interpret it in this way and also found the rate of 22 cents per 100 pounds reasonable outside of the seasonally based dispute itself.

Yet, copper country firms did have some success getting freight rates actually lowered. In August 1924, C&H, by that time basically a regional monopolist, petitioned Michigan’s Public Utilities Commission. The C&H argued that the railroads that shipped Lake copper to lower Michigan were charging more than “the combined ocean and rail rate on copper from Chile via Baltimore to Detroit” (*Engineering and Mining Journal-Press* [*EMJ-P*] 1924a: 350). The expected seasonal differential was also a factor, because the railroads charged 47 cents per 100 pounds in the winter and only 38 cents per 100 pounds when water navigation could compete with them. Nevertheless, C&H appeared to care more about the overall rate, which it believed was highly unfair. The firm instead contended that the rate should be 25 cents per 100 pounds. Nine railroads and

a ferry company were named in the suit; the defendants soon basically admitted to the state public utilities commission that the copper rates were too high and voluntarily offered to drop down to 30 cents per 100 pounds (*EMJ-P* 1924b). Although these voluntary reductions did go into effect (*EMJ-P* 1925), C&H continued to demand the 25-cent rate; they argued that Montana producers also recently had gotten reduced rates and that African and Chilean producers were charged lower rates to New York than were Michigan producers. C&H also wanted a rebate requirement from the railroads to make up for the prior differential. In short, C&H was willing to assert "that the excessive and unfair rates in Michigan are ruinous to the Upper Peninsula industry and favorable to competitors" (*EMJ-P* 1924b: 622).

In January 1925, even before the Michigan Public Utilities Commission handed down its decision, C&H went to the ICC regarding freight rates between the copper country and the East Coast, which were higher than to Detroit. The principles remained the same, however, with C&H asking for a year-round rate of 35 cents per 100 pounds of freight from Michigan to New York, as opposed to the 57 cents per 100 pounds paid in the winter and 48 cents per 100 pounds paid "in summer, when the Great Lakes transportation lines are in competition with the railroads" (*EMJ-P* 1925: 176). Again, similar to two other suits discussed above, C&H believed that it was paying too much both seasonally and compared with its competitors: Montana copper producers were paying only 62.5 cents per 100 pounds to ship to New York. A search of the ICC's decisions for the period yielded no record of C&H's application. Nevertheless, the railroads' voluntary cut down to 30 cents per 100 pounds did appear to aid Michigan producers, "putting them in position to compete for the mid-West markets" in 1926 (*EMJ-P* 1926: 218).

Around this time, general struggles over mineral freight rates had led the *Engineering and Mining Journal* (1926) to editorialize, somewhat pedantically, on what miners, custom smelters, and railroad freight agents should be doing to maximize profits and restore some peace and equitable profits to the industry. In effect, the journal called for the smelters and railroads to cease taking advantage of the miner's position. According to the editorial writer, a miner scaled production according to the grade of ore and costs with which he was faced, and freight rates were an important cost. High freight rates, along with other high costs of production, would mean "scaled down" mine production, but lower freight rates would mean lower extractive costs "and increasing reserves of profitable ore" (*EMJ* 1926: 82). The key point here for smelters and especially the railroads was that, by keeping their freight rates at a reasonable level, "the larger the

tonnage and the greater the profit of both smelter man and railroad. With lower freight rates, lower smelting charges result [because] the tonnage factor is materially increased" (*EMJ* 1926: 83). The lesson from this was clearly one of cooperation and an admonition against price gouging, in the name of profitability for the industry as a whole. The editors of the journal were attempting to affirm what they saw as a profitable dialectic of production, though they ended by putting more of the onus on mining firms. Because new technologies that allowed the working of more complex ores had the potential to increase ore tonnage (hence, to drop both smelting charges and rail rates), the journal asserted that "the miner [needed] to extend his development and increase his ore reserves, to the end that existing tonnages may be maintained and even increased" (*EMJ* 1926: 83).

What would such a policy mean for the copper country? Likely not much: by 1926, production was well on its way down, both relatively and absolutely, and as Gates (1951: 143–169) indicated, the industry was clearly "in decline." Even if copper country firms could increase tonnages, as per the journal's (1926) recommendation, the type of ore would not necessarily have benefited from the new technique; again, its lack of metallurgical complexity entailed only simple refining. Perhaps indicative of the changes, eastern railroads raised their rates for shipping refined copper from East Coast refineries to Midwestern manufacturing points (*EMJ* 1927a). The Detroit, Pittsburgh, and Chicago manufacturers that had relied upon Lake copper from the copper country were now basically at the mercy of East Coast processors: Detroit's rate per 100 pounds went from 25 cents to 31 cents; Pittsburgh's from 25 to 27; Chicago's from 32 to 40; "and similarly to other points," while, at the same time, certain East Coast manufacturing points received reductions in their rates (*EMJ* 1927a: 274). One possible advantage of the situation was that Midwestern firms were allowed to deduct 10 cents more (32.5 cents versus 22.5 cents) than East Coast firms because of "loss of interest on the value of copper in transit" (*EMJ* 1927a: 274–275). Nevertheless, this still shows the difference from 15 years before, when Lake producers would "settle on the basis of the New York price with freight allowance" when shipping to Midwestern manufacturers (Ingalls 1912: 889).

Later that year (1927), copper country firms, at least for the mining part of their operations, were able to catch a potential break from their coal suppliers, the other side of the Weberian problematics. Bituminous coal producers in the south (Virginia, West Virginia, Kentucky, and Tennessee), in competition with Pennsylvania coal producers (see Mansfield 1932), announced a voluntary 20 cents per ton reduction on rail shipments to

Lake Erie ports, which then shipped coal via the lakes to the copper country, among other places (*EMJ* 1927b). This would have resulted in major savings by copper country firms, among them especially the C&H, which estimated possible savings at \$100,000 per year. James McNaughton, C&H's president and general manager, became president of the Northwest Lake-Cargo Consumers' Association, which lobbied the ICC to accept the voluntary cuts (*EMJ* 1927c). The basic argument used by the coal operators and the various consumers' associations was, again, the seasonal character of the trade, because the coal "moves during the season of open navigation on the Lakes when demands of other markets are less active than in colder seasons" (*EMJ* 1927b: 465). Yet, the ICC did not accept the decrease, instead ordering the new rates canceled (ICC 1928: 367-410). According to Harvey Mansfield (1932: 121-122), the majority opinion had as much to do with politics as with any economic rationality. The southern coal shippers were dropping rates because coal made up a larger part of their traffic and were just trying to stay competitive with the northern fields that also had dropped their rates. Yet, Mansfield (1932: 116) states that "the southern reductions were naturally a challenge to the authority of the [Interstate Commerce] Commission," because it seems to have gone against Berk's (1994: 104-112) regime of "regulated competition." Suffice to say, the copper country and other upper Great Lakes' industrial areas once again were hampered by what now appear to be the larger imperatives of the federal state, more or less firmly oriented toward policies of cheap raw materials for its industrial core.

UNAVOIDABLY STAPLE TRAPPED?: A REMOTE INTERNAL PERIPHERY IN AN EMERGENT HEGEMON

The general case of the copper country and the specific legal cases examined here show how the political economy of the larger world-system articulates with local and regional physical factors to play a contributing role in determining the developmental outcomes for extractive areas. Yet, despite the imperatives of capital and their internecine struggles over freight rates, there were others in the copper country who desired a different trajectory than that of a "staple trap." As early as 1871, a local editor of the major copper country newspaper "argued that residents must no longer serve as hewers of wood and drawers of water for New England nabobs who financed the mines" (Thurner 1984: 18). The problem, as Arthur Thurner quickly pointed out, was that, other than copper, the copper country did not have much going for it and had to depend

on almost strictly outside sources of capital from distant urban areas that were much more powerful in the national political economy (see Bunker 1992). Any serious debate on regional development alternatives was, thus, effectively precluded.

This raises another obvious point from the copper country's experience: capitalist conflict was, in fact, regionally based, a manifestation of the world economy's regional nesting within the United States (Agnew 1987; Chase-Dunn 1989: 209–210). The struggle over freight differentials, although *prima facie* an attempt to control costs of production, was between various core places where the staple was processed and peripheral places where it was extracted. As Charles Mahaffey (1978: 26) put it, "within the copper district, transport developments were inspired or deterred by the status of the copper operations themselves." Indeed, William Parker (1975: 25–26) basically emphasizes (following from Gates 1951) that opening the Michigan copper country to extraction was core driven in the first place. He further asserts that its real importance was the resulting Sault Ste. Marie Canal improvement, which then allowed the extractive development of the upper Great Lakes natural resources. Thus, "the south shore of Lake Superior — the farthest reach of the Great Lakes system — was joined to the developing agricultural and industrial region of northern Ohio" (Parker 1975: 26). In other words, what was to become an emergent core region first had to become physically linked with a raw material supply, making the latter place a periphery, albeit within what would become a core nation-state.

For the United States, at least in terms of its existence as a capitalist nation-state, this may not have been a bad thing: large amounts of internally located raw materials enabled an easier ascent to the core (see Wright 1990). Perhaps this should be a generally expected consequence, because work from Britain (Hechter 1975) and Japan (Wigen 1995) also shows that other emergent hegemony first had internal peripheries to exploit. In terms of the given extractive regions themselves, however, this meant that "any investment in the region was really aimed at improvements in the ability to extract and transport raw materials from the periphery to the core" (Mahaffey 1978: 150; also Cohn 1982: 479–480). However, structural imperatives and secular historical trends do not mean that all firms necessarily will want to just "cut-and-run," so to speak, though their economic life in a given place will be inherently limited by depletion. As David Harvey (1982: 420) points out, the threat of place-specific devaluation will lead to intracapitalist struggle in short order, that is, a firm with any sort of fixed investment in a place will not want to see the value of its investment drop because of the actions of another firm.

Specific to this case, we saw that the Lake copper producers and manufacturers did not go down without a fight, albeit a losing one for the most part, when the railroads tried to take advantage of their geographical situation. This was part of the decay of the system based on the ICC, which Berk (1994) posits was an attempt at regional parity in both transportation and economic development. Enough larger railroads with an interest in core-oriented transport policies were willing to challenge it and were supported by a sympathetic federal Supreme Court that basically emasculated the ICC's regulatory powers (Berk 1994: 104–112; also Skowronek 1982: 150–160).

More generally, it still appears that the key to industrial survival “ultimately depend[s] on the existence of a supportive economic environment — accessible markets and raw materials, cheap transportation and a favourable location” (Tronrud 1990: 2). Although the copper country may have had the raw materials, its markets and their location were dependent on cheap transport, which ended up not being so cheap for the more-manufactured goods, as the American Insulated Wire case showed (see above and ICC 1913b). As well, the 1928 Lake Cargo Coal case showed the difficulties of securing the energy supplies at more reasonable rates. After the core-oriented “corporate liberalism” that Berk (1994) speaks of became both the de facto and de jure policies toward transport, the copper country seemed to have had even fewer opportunities to get out of its staple trap.

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8

The Incorporation of West Africa: A Numerical Analysis of Railroad Expansion

Richard Lee

The empirical reality of the expansion of the European “world” over the past 500 years has never been in doubt. Even the differential in the rates of spatial expansion along several dimensions — political, economic, and sociocultural — has been well-recognized. The extension of this system, the modern world-system, coincident with its defining axial division of labor, delimits a finite geographical space articulated among a center and concentric zones differentiated in turn by increasingly unequal trade relationships, mechanization, and commodification: core and periphery. Expansion is essential to the maintenance of the modern world-system (Wallerstein 1985). It takes place both internally (deepening) and externally (widening) through the incorporation of internal “sacs,” in which the social division of labor is not yet complete, and previously external areas, with their new pools of cheap labor. Both constitute systemic responses to succeeding crises of accumulation in the core reflected in periodic economic and political fluctuations or cycles.

Regarding the new peripheries where cheap raw materials and agricultural cash crops are exchanged for core manufactured products, clearly “the patterns of geo-political expansion . . . theoretically integral to the accumulation process” (Hopkins & Wallerstein 1982b: 50) depend on the expropriation of the means of production from the direct producers — proletarianization. These patterns thereby entail a continuing process of primitive accumulation as the key element of expansion, without which

capitalism cannot survive its recurring internal crises. In the process, existing indigenous historical social systems are replaced or significantly modified as they are incorporated into the network constituting the world market.

Adam Smith realized that the establishment of monopolies in the new colonies during the first wave of merchantilist expansion, dating from the fifteenth through the eighteenth centuries (Bergeson & Schoenberg 1980), could be counterproductive. Costs to the central governments of the "mother countries" could easily outweigh profits. The value of colonies accrued through trade and exchange, rather than tribute in goods or services, and Smith associated the low cost of labor in the colonies with capital accumulation. "The great fortunes," he wrote, "so suddenly and so easily acquired in Bengal and the other British settlements in the East Indies, may satisfy us that, as the wages of labour are very low, so the profits of stock are very high in those ruined countries" (1937: 94). Now, at the end of the second great wave, world-systems analysts offer parallel conclusions as regards the world economy as a whole. Hopkins and Wallerstein indicate that "geographic expansion was ultimately neither the search for things to purchase nor to sell in some immediate sense, but the search for cheap (or cheaper) labor in the productive networks of the world-economy, precisely to compensate for other pressures which tended to raise the cost of labor within the already incorporated zones, and thereby reduce the overall accumulation of surplus-value" (1987: 776). As instances of this process, the two great waves of expansion and incorporation followed similar patterns of discovery, conquest, subjugation, and exploitation.

IMPERIALISM IN WEST AFRICA

The voyages of discovery opened a new chapter in the history of western European peoples and those with whom they came in contact. South America was carved up between Spain and Portugal, and much of the interior was systematically explored and dominated. Its great cities were founded within 50 years of Columbus's voyage to the Americas and its peoples subjugated to *repartimiento* and slave-based systems of surplus extraction. During the seventeenth century, rival powers laid their claims to North America and began the inexorable march of colonization, and slavery, there. By 1509, the Indian Ocean was firmly in Portuguese hands. Although they were soon to be displaced by the Dutch, by 1614 they controlled the East Indies trade. Their victory at Plassey (1757) established the English as the leading power in India, and, in less than 90 years, they

dominated the whole of the subcontinent.

However, the story reads quite differently in Africa. The Portuguese had made heavy investments in the exploration of the western African coast from the latter half of the thirteenth century, and, by 1445, their trading posts assured them a trade of 25 caravels a year (Langer 1948: 363). Four years before Columbus's historic voyage, Bartholomeu Diaz reached the Cape of Good Hope, and, in 1497, Vasco da Gama rounded the cape, sailed up the east coast as far as Mombasa (much to the consternation of jealous Arab traders), and turned for home only after touching the Malabar Coast at Calicut. The Dutch, French, and English followed, establishing their own "trading post empires" (Braudel 1986: 119) in western Africa, or as Philip Curtin has termed them: "musical trading posts centered on naval power" (1975: 102) that changed hands often in successive maritime raids.

In spite of this activity, the interior of the continent was neither explored and dominated nor even claimed. No strong central power blocked colonial expansion, as had been the case in China. All the same, "the Africa interior was protected by its comparatively dense settlement and by the resilience of societies which, unlike those of the pre-Columbian Americas, were acquainted with iron metallurgy and often harboured warlike populations" (Braudel 1986: 431). It was, then, spared Western domination long after North and South America and South Asia had succumbed. In this first wave of colonial expansion, the crises of the world economy were resolved more readily elsewhere than in Africa, where the cost-benefit ratio tilted in favor of regulating access to trade rather than exerting control directly at the point of production.

West Africa remained an unincorporated, external arena until the end of the nineteenth century. Internally, the region presented a full panoply of noncapitalist sociopolitical systems ranging from stateless societies to local, secondary empires. Paradoxically, the Tiv and the Ibo of Nigeria, stateless societies, offered particular resistance to British conquest in part because they had no vested authority that could tender submission for the whole group. From the eleventh century until the partition, such empires as those of Mali, Ghana, and the Songrai rose and fell, and the Yoruba, Asante, Benin, Oyo, and Dahomey saw periods of ascendancy. West Africa flourished during this era. Great cities were founded and important artistic patrimonies created.

Long-distance trade was vital and highly esteemed among these diverse groups (Meillassoux 1971). In fact, one of the major reasons for conflict was control of the great overland trade routes. The most important of these served the entire hinterland from Senegal to Cameroon and included the

“Salt Route” from Mali to the Atlantic and the boat traffic on the Niger extending from Timbuktu southwest to the Buré gold field and southeast and south to Yoruba-land and Benin. Overland routes connected the Akan gold field of Ghana east to the Hausa peoples and north to the Niger. The actual quantity of trade in western Africa during the three centuries prior to colonial expansion into the interior showed a slow but continual increase in volume. During the century preceding partition, evidence suggests that intra-African overland trade increased even more rapidly than overseas trade and that Africans profited from improved terms of trade resulting from reduced production costs in the core, although, with conquest, this trend was to reverse (Curtin, Feierman, Thompson, & Vansina 1978: 369–372; Bohannan & Curtin 1971: 307).

Noteworthy, however, were the patterns and quality of precolonial trade. “State necessities” and “luxury goods” traveled both north and south (Hopkins 1973: 81). Zakari Dramani-Issifou (1982) has shown that, at least as early as the eleventh century, a part of the flow of sub-Saharan African products, particularly gold, ivory, and slaves, was ferried across the Saharan “sea” (Curtin 1975: 4) by caravans destined for Islam and even the Turk (Braudel 1986). There was no need to invent the goods that were to fill the holds of the caravels. When the time came, they simply were siphoned away from the caravans, the fleets of the desert, to those of the Atlantic.¹ Export to Europe and the Americas was carried on by way of the coastal trading posts, primarily through middlemen. Generally of mixed descent and, thus, immune to the tropical diseases but wise in the ways of European commerce and languages, these traders formed the local elite of the precolonial period.

During the first period of European expansion, the loci of western African trade slowly shifted from vectors of intra-African and trans-Saharan exchange to those terminating at the coastal trading posts, where they linked up with the south Atlantic subsystem of the western European long-distance network. Finally, between 1879 and 1882, the French began to move in Senegal. They annexed territory and trading posts and projected a rail line inland designed to capture western Sudan in an ambitious plan to control much of Africa west of Egypt and the Congo (Hopkins 1973: 194). Almost immediately, Germany, Portugal, and Britain followed suit. Hard on the heels of Sir Henry Stanley, King Leopold of Belgium became convinced of the fortunes to be made through direct control of the African interior. The “Comité d’Etudes du Haut Congo,” which later became the “Association Internationale du Congo,” was formed with the final objective of obtaining African territory for private Belgian commercial and economic interests directly linked to the king. The rapid

recognition of Leopold's true aims was one in a series of diplomatic maneuvers and aboutfaces, including the Berlin Conference of 1884–85, which resulted in the partition of Africa. In the space of a decade, all of the great powers became involved in the "scramble." By 1914, the entire continent was subject to claims recognized under international law. Contemporary with the shift from the luxury-goods trade to the already rapidly growing export of bulk products, this new wave of imperialism differed profoundly from the earlier tide that had swept across North and South America and much of Asia from the fifteenth through the eighteenth century (Hopkins 1973; Woolf 1968).

Whereas the earlier surge of expansion had been based on settlement and the re-creation of European civilization, this second wave was patently geared to economic exploitation (Dumett 1975; Hopkins 1973; Mangolte 1968; Munro 1976). Besides the active resistance of the indigenous population and the formidable topography, the strongest single deterrent to European penetration into the interior of western Africa had been the "malaria curtain" of tropical disease. Death rates for newly arrived Europeans could run as high as 75 percent in the first year. During the 1818–36 period, death rates were five to six times higher for Europeans in western Africa than in India or the West Indies. Yellow fever and *Plasmodium falciparum* malaria were particularly fatal (Curtin et al. 1978: 214–215, 445–446). Africans, though, were relatively immune to the European diseases that had wiped out the indigenous populations of the New World (of course, making them that much more attractive as slaves). However, well before the beginning of the colonial period, the effectiveness of drugs such as quinine (known since the 1650s) and of basic medical hygiene had been recognized. Even the problem of a reliable source of quinine was finally resolved in 1854 when the Dutch began commercial production on plantations in Java (McNeil 1976). However, advances in hygiene and medical care were slow to be implemented. Africa remained inhospitable, and return on capital was uncertain. It was one thing to possess an empire, it was another to live in it, and it was still another to make it pay. The export of excess population to western African colonies was simply never a seriously considered motive for their acquisition by any of the great powers (Woolf 1968).

As competition in Europe escalated, Joseph Chamberlain, head of the British Colonial Office, and Jules Ferry, who as prime minister was responsible for the aggressive imperialist policies of France of the time, were both in agreement on the economic importance of the African territories. Even Otto von Bismarck, so long opposed to the formal possession of colonies, became convinced of the necessity, as Ferry put it, of finding

“outlets for our industries, exports, and capital” (Woolf 1968: 46). In order to be of any value, however, these vast areas, once claimed, somehow had to be developed.

Sir F. D. Lugard asserted that “the material development of Africa may be summed up in one word — transport” (1922: 5). This was certainly a gross simplification, but it did capture an important dimension of the problem. Unfortunately, western Africa was, and is, ill-suited to the building and maintenance of roads, and river routes have never served more than a small portion of the territory. Profitable export of the African bulk goods produced by cheap labor depended on lowering high transportation costs, particularly in the face of the depressed commodity prices of the 1880s. So, as Lugard continues: “the development of the African continent is impossible without railways, and has awaited their advent. . . . One railway train of average capacity and engine-power will do the work of thirteen thousand carriers at one twentieth of the cost” (1922: 462).² Investment in railroads seemed the natural solution for tapping into the riches of the interior as well as providing the transportation infrastructure needed to exercise the military and administrative control that formal domination required. Indeed, the “Berlin West African Conference of 1884–85 referred to effective occupation of territory, and it is frequently stated that this was widely interpreted as being unmistakably demonstrated by the presence of railway lines” (Morgan & Pugh 1969: 455). It should be added that the market for rails and rolling stock was well-appreciated by producers in the home country. Railroads actually accounted for the heaviest investments in capital goods made by the colonial powers in western Africa. The English Colonial Loans Act of 1899, for example, slated more than ten times the capital for railroads than for port facilities (Dumett 1975).

Although land tenure relationships in the nineteenth century were, in many areas, already evolving in conjunction with the development of labor-intensive cash crop agriculture, a suitable labor force in adequate numbers was not always available. Mining and railroad construction as well suffered in this way. In areas such as the Senegambia and the Gold Coast, the railroads provided the transportation necessary to bring in migrant workers, thus, creating a new labor pool of instant wage laborers. In the case of Gold Coast cocoa (in which the carriers freed up by the railroad were absorbed in cocoa production), high levels of entrepreneurship, innovative “joint land purchases,” construction of infrastructure, and “educational development” were direct outcomes of the opportunities opened up by the new railroads. As for peanuts in Senegal, here, too, the boom was a self-reinforcing consequence of the new railroads. Peanuts

had been cultivated for export by migrant labor in the Senegambia as early as the 1840s. Farmers came from as far away as Upper Volta and Sudan, and some eventually began to settle permanently in the new regions.³ Although African farmers were sensitive to European demand, which for peanuts was high, only so much product could be moved to port by camel caravan. With the completion of the Dakar–Saint-Louis line (a financial failure), peanut exports soared from the average of 15,000–20,000 metric tons to 140,000 metric tons in 1900 (Curtin et al. 1978: 506–510; Dumett 1975; Semi-Bi 1976; Weiskel 1979).

Labor coercion was a characteristic of both precolonial and colonial western Africa. The brutality of the colonial period and the transition to “free” wage labor is well-documented (Mangolte 1968; Semi-Bi 1976; Smith & Sender 1986), and coercion was met with active resistance, including large uprisings. However, the organization of the transport sector during the colonial period, with its huge concentrations of relatively well-educated, skilled and nonskilled wage laborers, presented a new situation, the occasion for large-scale collective action and political organization. Railroad and harbor workers “were the only group of Gold Coast wage-workers to establish union organization on a durable basis prior to World War II.” In Nigeria, the railway was also the birthplace of “manual-worker unionism,” which would be associated with “most of the attempts to create worker-based parties or union-party alliances” after 1945. In French West Africa, the 1947–48 railway strike for a “non-racist labour hierarchy . . . was the longest strike in African union history, covered workers on all four railway networks,” and won substantial concessions (Smith & Sender 1986: 16–17).⁴

Thus, not only were railroads instrumental in the control of territory and the exploitation of natural resources by providing cheap transport for the removal of bulk goods and the arrival of heavy mineral extraction machinery (Dumett 1975), they also had a profound effect on the social division of labor and the relations between labor and capital.

RAILROADS IN WEST AFRICA

The relative amount of rail line in service over time taps the theoretical dimensions of both territorial expansion and core investment and can be used as an operational measure of both. In the case of western Africa, data are available for two separate indicators dealing with rail transport (Mitchell 1982). Series for the number of kilometers of railroad in operation per year and the number of passengers carried by the railroads per year were constructed for the following countries: Senegal, Guinea,

Sierra Leone, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Zaire, Angola, and Namibia. The data were interpolated where no more than three consecutive observations were missing. Aggregate measures — total kilometers of railroads in operation in western Africa per year and total railroad passengers in western Africa per year — then were computed from the country series. In order to correct for local nonsystemic disturbances and smooth the curves, three-year moving averages for both were made. The absolute change per year, the first difference, also was calculated.

Passenger traffic on early western African railroads was directly related to available employment opportunities and the growth of the money economy. In a generalized situation of labor shortage, labor-intensive agriculture and mining depended for their profitability on cheap labor supplied through, and freed up from head portage by, the new transportation network. In addition, itinerate merchants gained access to formerly isolated communities where their goods, for sale for money, acted as an enticement for the local populace to move into the new towns built along the tracks (Semi-Bi 1976). The relative proletarianization over time of the newly incorporated areas was, therefore, correlated with the relative population mobility operationalized as railroad passenger density. This third aggregate measure, western African railroad passenger density, was constructed by dividing the total number of passengers per year by the total length of line in operation per year, and the three-year moving average was computed.

The measure of the total number of kilometers of railroads in operation per year up until 1913 was disaggregated by colonial power, that is, Great Britain, France, and Germany, and the mean of the first difference (mean absolute rate of change) of each of these was calculated.

We would expect territorial expansion through the formal acquisition of colonies to occur at a higher rate during periods of core leadership when competition for hegemony is most acute (Hopkins & Wallerstein 1982b; Modelski 1983). Therefore, the rapid expansion of railroads in western Africa indicating the extension of core territorial control should occur during a hegemonic deconcentration phase.⁵

As a corollary, colonial expansion by direct competitors for world hegemony will be more pronounced than that of noncompetitors. Therefore, British and German (hegemon and main contender) expansion of railroads into western Africa should be greater in absolute terms than French railroad expansion until the outbreak of global (core) conflict.

Periphery investment will tend to take off during periods of economic slump in the core when core nations need to guarantee supplies of cheap

raw materials (Hopkins & Wallerstein 1982b; Rosecrance 1987) and have large amounts of excess capital available (Hopkins & Wallerstein 1982a). Therefore, expansion of railroads indicating core investment in capital goods in western Africa should take off during a trough of the core Kondratieff wave.⁶

Once incorporation of an external area has begun, proletarianization of the indigenous population to show long-term positive growth will occur (Hopkins & Wallerstein 1982b). Therefore, the western African railroad passenger density should increase over time, indicating a positive secular increase in proletarianization.

The data show that, in effect, as illustrated in Figure 8.1, railroad construction in western Africa exploded during the latter part of the hegemonic deconcentration phase of 1874–1913, indicating advancing military-administrative territorial control. Figure 8.2 illustrates the steady rise in the rate of competitive construction up until 1913 and the long-term decline in the rate during the global war phase and the reestablishment of hegemony. Construction during this initial period represents fully half of the total still in service in 1975.

Upon examination of Table 8.1, core competition becomes particularly apparent. The declining hegemon and its contenders, Britain and Germany, constructed 2,346 kilometers and 2,740 kilometers of railroad line, respectively, against 2,395 kilometers for the French. The mean absolute expansion of the French lines, however, was less than half of that of the British and the Germans (79 kilometers per year versus 164 kilometers per

TABLE 8.1
Hegemonic Competition: Railroad
Construction in Western Africa

	Total Kilometers of Railroad 1883–1913	Mean Absolute Increase Per Year (kilometers)	Number of Years Construction
British Colonies*	2,346	164	15
German Colonies†	2,740	179	17
French Colonies**	2,395	79	31

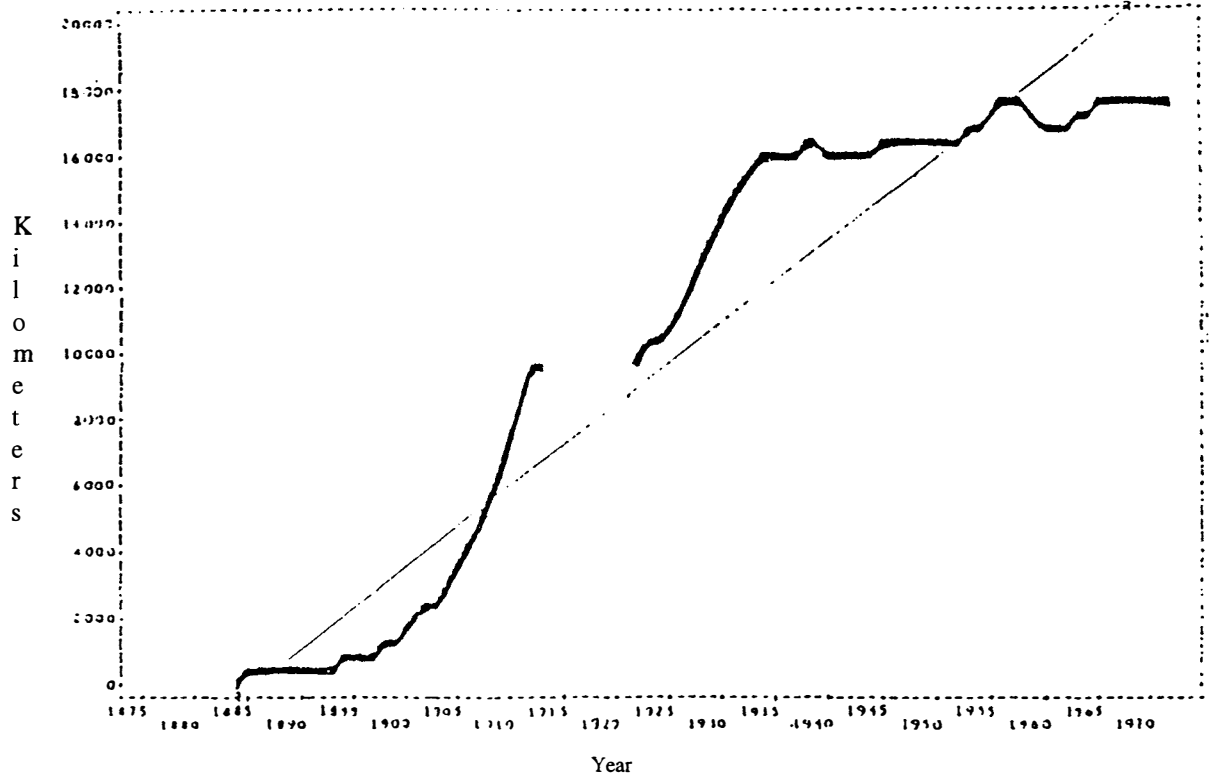
*British Colonies: Ghana, Nigeria, Sierra Leone

†German Colonies: Cameroon, Namibia, Togo

**French Colonies: Benin, Guinea, Ivory Coast, Senegal

Source: B. R. Mitchell. 1982. *International Historical Statistics: Africa and Asia*. London: Macmillan, p. 496–503, 508.

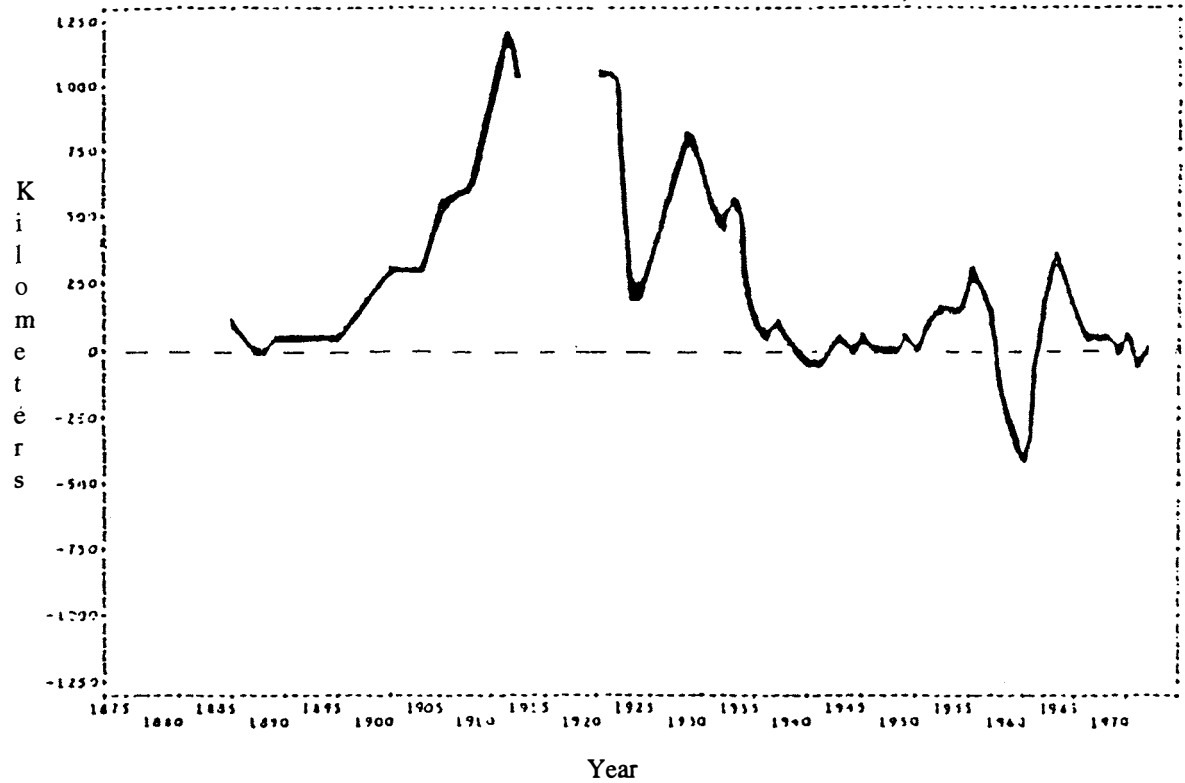
FIGURE 8.1
Length of Rail Line in Operation (Namibia Included), 1883–1973



correlation coefficient	0.957	mean (Namibia excluded)	10394
R ²	0.91584	mean standardized slope	0.024035
slope	249.82		

FIGURE 8.2

Absolute Change: Kilometers of Railroad in Operation



year and 179 kilometers per year) once the race had been joined. It should be remembered, in fact, that France began railroad construction in western Africa in 1881, well before Britain or Germany. As the core approached the global war phase of the hegemonic cycle, competition became more acute. These findings are underscored in Figure 8.2, which indicates an increasing overall rate of expansion until the global war phase and a decline thereafter.

Despite the huge amounts of loose capital searching for investment opportunities during the Kondratieff depression phase of 1874–82, major investments in infrastructure did not begin to find their way to western Africa until the 1880s and, particularly, the 1890s. There was a clear lag between the availability of capital and actual investment. On the whole, we must conclude that investment began to build during the Kondratieff recovery phase rather than the depression and was heaviest after 1893.

On the average, between 1883 and 1973, the number of passengers carried per kilometer of railroad in service increased by 19,000 travelers. The positive slope of the regression line of the passenger density curve, shown in Figure 8.3, is a prime indication of the deepening incorporation of this previously external region.

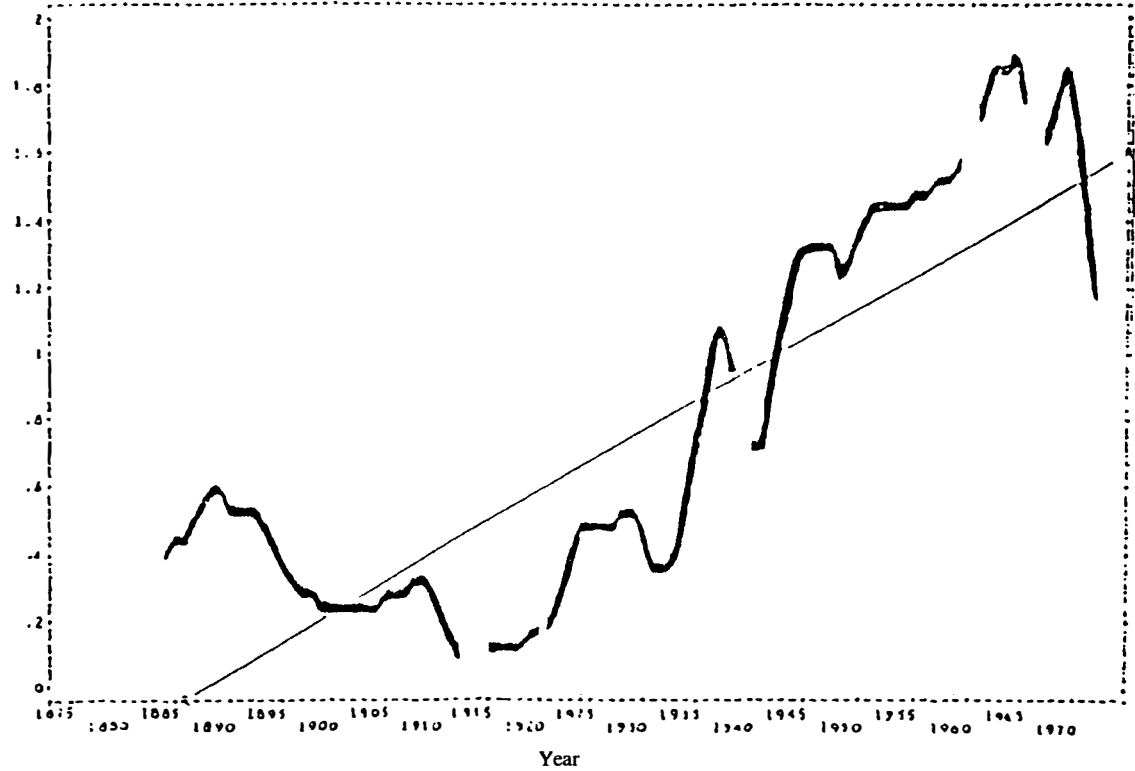
CONCLUSION

The initiation and increasing rate of western African railroad construction prior to 1914 is indicative of the extension to western Africa of core competition. The trend was begun by the French, who, with an eye on the development of Germany as a great power (and the recent defeat in the Franco-Prussian War) and British commercial expansion by indirect means, were the first to invest in railroads as part of a new policy of conquest and direct rule. The previously adequate “informal” empires of low tariffs and “free” trade were rapidly replaced with firm policies of political and economic controls to solidify colonial trade monopolies. This was a rush not only to further economic enterprises but also to protect their exploitation.

Albeit “decisions to expand [were taken] during periods of recession and depression” (Rosecrance 1987: 300), response in the core to changing political and economic realities was uneven. France (and even Portugal and Belgium) began construction well before Germany and Britain, but, once initiated, German construction proceeded at a faster pace than either British or French. Difficulties in the mobilization of popular political opinion and elite support for initiatives in western Africa accounted for some of the delays in investment relative to the availability of capital

FIGURE 8.3
Rail Passenger Density Per Year

Millions of Passengers per Kilometer



correlation coefficient	0.85383	mean	0.7804
R ²	0.72903	mean standardized slope	0.024385
slope	0.01903		

(Dumett 1975). Also, the entire period 1873–96 was perceived widely at the time as a “great depression” (Hopkins 1973: 159; McGowan 1981: 53). However, the situation below the surface was more complex. Although Chamberlain in England often had called for heavy investments, these were never forthcoming at the level he desired. Rather than seeking to retain her preeminence in the face of competition offered by newly industrialized core states through reindustrialization at home and investment in infrastructure in her colonies, Britain, the leading economy (Hopkins 1979; Modelski 1981), seemed to retreat into the previously valid but no longer adequate assurances of “Free Trade and Empire” (McGowan 1981: 56). This illustrates the way the inertia of high levels of sunk capital works to the advantage of latecomers, in this case, Germany. Thus, the link between colonial investments and the Kondratieff depression calls for various but interrelated explanations. For instance, distinguishing between private and public monies, private investment in Africa was limited by complete lack of any guarantee on return. African railroads were built almost exclusively with public funds in anticipation of demand. They often ran at a loss; also, Africans themselves often took the lead in establishing, or were already at the head of, the production enterprises they eventually served.

The passenger density curve (see Figure 8.3), which on inspection suggests the cyclical rhythms constitutive of the capitalist world economy, is also worthy of comment. During the early period of construction, many passengers were the newly created (coerced) “free” laborers of the track-laying crews and the new mines or migrant agricultural workers, as had been predicted in the early proposals: “la main d’oeuvre noire assurant l’exploitation” (Brunschwig 1967: 184). Desertion rates among these workers unaccustomed to wage labor were very high. When construction leveled off or worker management was humanized (policing quickly consumed profits), a decline in passenger density could be expected. During the later period, the cyclical pattern in passenger density could well indicate the super exploitation inherent in the process of part-lifetime proletarianization (Hopkins & Wallerstein 1982b). As economic conditions fluctuated (for instance, when world commodity prices dropped), marginally employed or seasonal wage laborers could find themselves out of jobs or too poorly paid to make ends meet. Thus, downswings in passenger density could be expected when only a return to subsistence agriculture promised survival (Coquery-Vidrovitch 1976). In the long term, a comparison of the mean standardized slopes of the regression lines of the passenger density curve and that of railroad expansion suggests a deepening as well as a widening proletarianization — an effect typical of the

incorporation process but only indirectly reflected on our measurement tool, railroad development.

NOTES

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1. This trade continued into the colonial period. It was only the arrival of the Lagos railway at Kano in 1911 that signaled the "final decline of the old, north-facing, trans-Saharan trade, the reorientation of the markets of the interior towards the coastal ports, and the coalescence of two centres of exchange which, in previous centuries, had been in only sporadic contact with each other" (Hopkins 1973: 197).

2. Even the wheel was of little use in vast regions of the interior, where draft animals fell to trypanosomiasis and "all goods had to be carried by human porters" (Bohannan & Curtin 1971: 34).

3. The Senegalese *navétanes* or Gambian "strange farmers" invested their earnings at the end of the peanut season in an "assortment of imported goods for resale on their return home. Their annual pattern of activity, thus, began with seasonal work in agriculture, from which they earned capital for investment in a single venture in long-distance trade" (Hopkins 1973: 221; Curtin et al. 1978: 507).

4. For industrial action by western African railroad workers (e.g., Gold Coast 1918, Sierra Leone 1919, Senegal 1925), see R. Jeffries (1978) and M. Crowder (1968).

5. The shifts of concentration and oscillations in strength of hegemonic power within the core preserve the system from breaking down into separate empires or collapsing into a single world empire (Wallerstein 1985). On these cycles of core leadership or hegemony, see Albert Bergeson (1985), Joshua Goldstein (1988), and George Modelski (1983). The cycles of core leadership used in this study are according to Modelski (1981).

6. The economic cycles of expansion and stagnation known as Kondratieff waves image the restructuring of the system because of the internal contradictions of capital accumulation. See Hopkins and Wallerstein (1982a, 1982b); Goldstein (1988); Nikolai Kondratiev (1973); and David Kowalewski (1986). The periodization is that given by J. J. Van Duijn (1983).

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9

Oil, Pipelines, and the “Scramble for the Caspian”: Contextualizing the Politics of Oil in Post-Soviet Kazakhstan and Azerbaijan

Saule Omarova

This chapter examines the process of negotiating oil contracts between the governments of two newly independent ex-Soviet states — Kazakhstan and Azerbaijan — and the multinational oil companies.

I will start with the brief description of the events that are taking place in Kazakhstan and Azerbaijan, in order to demonstrate the complexity of oil politics in the region. Political considerations are extremely important in shaping behavior of the main actors involved in the bargaining game. It is impossible to grasp the meaning of the process without bringing into the analysis a whole range of historical, political, and ideological factors.

However, the extremely high degree of politicization of the bargaining process involving a number of strategic players within the region tends to overshadow the fundamental importance of natural, geographic, technological, and economic factors. Ignoring these factors introduces a dangerous seed of excessive voluntarism. This chapter is an attempt to incorporate physical and natural processes into conceptualization of oil politics in Kazakhstan and Azerbaijan and, thus, provide a more balanced (although rather tentative) explanation of the behavior of different actors.

A thorough analysis of the bargaining process requires close examination of the industrial organization and market structure of the oil industry, which are fundamentally shaped by the physical characteristics of oil. Therefore, the next part of this chapter is devoted to the organization and functioning of the international oil industry. This analysis will provide the

basis for moving away from the initial narrative, which tends to overemphasize political factors driving oil negotiations.

Three sets of questions arise in this respect.

The first set of questions focuses on the behavior of the governments of Kazakhstan and Azerbaijan. What determines the range of choices available to them? What factors affect their bargaining position? I argue that, in spite of the importance of political maneuvering, the basic physical characteristics and geographic location of their oil reserves impose severe constraints upon their actions.

The second set of questions concerns the behavior of the multinational oil companies. Why are they so persistent in their attempts to stay in Kazakhstan and Azerbaijan, in spite of the tremendous difficulties caused by economic and political uncertainty? Oil extraction and refining is quite costly: the Kazak and Azerbaijani crude is highly sulfurous and lies mainly offshore. The landlocked geographic location of both countries requires heavy investments in a pipeline project. So far, in spite of substantial initial investments, these companies have not been able to get oil out of the region. Are the Caspian reserves so vast that the potential profits justify such high risks?

To comprehend the multinationals' behavior, one should focus on how the international oil industry is organized. Its oligopolistic market structure provides the grounds for the hypothesis that the real goal of the companies is not so much getting actual oil out of the region as securing an exclusive access to a potential source of supply. In an oligopolistic market, creating excessive capacity helps to sustain high barriers to entry and, thus, keep market power in the hands of the few oligopolists.

The last set of questions deals with Russia's behavior. To what extent is it driven by political and ideological considerations, and to what extent does it reflect Russia's economic interests?

Russia's position in the pipeline negotiations lends support to the argument that Russia's strategy to redefine and reestablish her regional hegemony follows the general historical pattern — her central goal is securing control over transportation of oil in the region (Bunker & Ciccantell In Progress).

Such an approach allows us to avoid oversimplification of Russia's strategic interests: it is not simply an imperial inertia or even a desire to get a share of lucrative oil deals. By preserving and maintaining effective control over the pipeline system (and, thus, over the flow of oil in the region), Russia will create her regional hegemony on a new basis, that is, without direct political subordination of Kazakhstan and Azerbaijan. In many respects, such an arrangement will be much more reflective of

Russian economic interests: it will enable Russia to shift costs significantly upon these formally independent states.

Similarly, Iran's and Turkey's behavior also should be conceptualized as attempts to rise to a hegemonic status within the region. From this perspective, both Iran's desire to expand Islamic influence and Turkey's claim to offer a culturally suitable model of modernization become only part of the story.

POLITICS OF OIL IN CONTEMPORARY KAZAKHSTAN AND AZERBAIJAN: ACTORS, ISSUES, EVENTS

After the Russian Federation, Kazakhstan and Azerbaijan are the largest oil-producing republics in the former Soviet Union. About 70 percent of non-Russian oil output comes from Kazakhstan and Azerbaijan. Because these republics' oil sectors were given relatively low priority during the Soviet era, when the bulk of the investment was concentrated in western Siberia, their petroleum reserves remained largely unexplored. Even the most conservative Western estimates recognize the tremendous oil potential of the region surrounding the Caspian Sea — the second largest concentration of oil reserves within the former Soviet Union. According to some estimates, the Caspian Sea proven reserves total 42 billion barrels, with an additional 160 billion barrels of potential reserves. By comparison, Saudi Arabia's reserves total 250 billion barrels (Ignatus 1995).

After declaring independence in 1991, the governments of Kazakhstan and Azerbaijan made serious claims to become major oil exporters. In both republics, oil is seen as the engine of economic recovery and future growth. Both governments explicitly made promotion of oil exports their main economic priority and were eager to establish cooperation with foreign capital. A number of major transnational oil companies — Shell, Exxon, Mobil, British Petroleum, Amoco, Chevron, Elf Aquitaine, and others — already have signed multi-billion-dollar contracts with the governments of Kazakhstan and Azerbaijan. So far, however, neither Kazakhstan nor Azerbaijan has been able to use their oil to speed up economic development and achieve real independence from Russia.

There are important structural factors rooted in the discrepancies of the post-Soviet economies that account for this failure. First and foremost among them is the problem of transporting Caspian oil to international markets. Lack of infrastructure is the central obstacle to building Kazakhstan's and Azerbaijan's economic independence and promoting

economic growth on the basis of oil exports. Construction of new pipelines is the most urgent and complicated issue for these landlocked countries. A legacy of the Soviet command economy, the existing system of oil production and consumption is ill-suited for the post-Soviet reality. Although Kazakhstan still is dependent on oil imports from western Siberia, Azerbaijan largely depends on refined oil products from the Ural-Volga region. Existing pipelines also run through Russia's territory and are managed by Russian companies.

It is important to note that, in some respects, Kazakhstan and Azerbaijan significantly differ from each other as potential oil exporters. Although both countries are landlocked, Azerbaijan's strategic geographic location puts it in a much more favorable position than Kazakhstan. Bordering with Iran and Turkey, Azerbaijan has a potential access to international oil markets. Kazakhstan, however, is separated from both Iran and Turkey by the rest of central Asia. The republic has a long border with Russia, and its economy always has been very tightly linked to the Russian economy. Furthermore, Azerbaijan has a well-developed infrastructure necessary for the oil industry: oil processing plants, machine-building enterprises producing equipment for the oil industry, highly qualified engineers and skilled workers, and so on. In Kazakhstan, lack of infrastructure and trained labor force are major problems: for instance, two out of three main refineries in the republic are completely isolated from the oil-producing regions, and their low refining capacity makes Kazakhstan dependent on imports of refined petroleum products from Russia.

In spite of these relative advantages, Azerbaijan has not been more successful in its pursuit of oil-based independence than Kazakhstan. Purely structural factors do not explain everything. There are important political factors responsible for these states' failure to generate economic growth through expanding oil exports. The issue of pipelines is the best example of how various political interests affect settling economic matters and how the interests of the international actors shape the policy choices made by the governments of Kazakhstan and Azerbaijan.

In practical terms, both countries need a new pipeline system that would enable them to satisfy their domestic needs and greatly increase their oil exports. Obviously, this is a very expensive undertaking, and neither Kazakhstan nor Azerbaijan could afford it on their own. Western oil companies, keenly interested in developing these states' rich oil deposits, are willing to take part in financing construction of new pipelines. However, from the very outset, choosing the pipeline route has been an extremely controversial political issue. The pipeline debate still remains an arena of intense political struggle involving the governments

of several Western countries, Russia, Turkey, Iran, and a whole range of other regional actors.

Although each actor in this new “Great Game” has various bargaining levers, the balance of power in the region is undoubtedly in favor of Russia. Not surprisingly, Russia plays the decisive role in the whole process. Russia’s interests are far from being purely economic; there is a very strong geopolitical rationale for Russia’s behavior. Oil is one of the main instruments used by Russia in order to maintain its influence in the region. On the other hand, Turkey and Iran are actively seeking to expand their influence in central Asia and Azerbaijan. All three rivals — Russia, Turkey, and Iran — proposed to build pipelines through their territories. From the beginning, there were three principal pipeline routes under consideration: one leading to the Russian Black Sea coast, another to the Turkish Mediterranean ports, and the third through Iran to the Persian Gulf. Each option had its own advantages and shortcomings, both economic and political. The decisions, however, were made mainly on the basis of various political considerations. Thus, the Iranian option was rejected as politically unacceptable to the West (although Iran is still trying to secure some of the secondary pipeline routes through its territory). The Turkish route is favored both by the West and by Kazakhstan and Azerbaijan but vehemently opposed by Russia. After several years of economic and political pressure, Russia has prevailed, and both Kazakhstan and Azerbaijan agreed, although quite reluctantly, to transport their oil to a crowded and technologically ill-equipped Russian Black Sea port of Novorossiisk. In the Azerbaijani case, though, a compromise “two-track” decision was reached: the consortium agreed to export Azerbaijan’s so-called early oil via two pipelines — the Russian “northern route” to Novorossiisk and the “western route” through the Georgian Black Sea port of Supsa to Turkey’s Black Sea terminals. Though the decision on the final pipeline route is still to be made, both Russia and Turkey perceived that decision as a strategic victory improving their respective bargaining positions in the long run.

Since 1994, another hot issue has been in the center of the struggle for the right to control oil and gas flow in the region. Russia is contesting Kazakhstan’s and Azerbaijan’s legal rights to exploit the mineral resources in what they view as “their” sectors of the Caspian shelf. Because the legal status of the Caspian Sea is not clearly determined, Russia claims its share of control over other Caspian states’ resources. Kazakhstan and Azerbaijan insist on dividing the Caspian shelf into national sectors and granting each littoral state an exclusive right to develop mineral resources in its own sector. In contrast, the Russian Foreign

Ministry argues that the Caspian Sea is a unique landlocked body of water with a single ecological system and that it should be used jointly by all littoral states without dividing it into national sectors. Iran, angered by its recent expulsion from the consortium developing the three major oil fields in Azerbaijan, supports the Russian doctrine of shared use of the Caspian resources, while Turkmenistan (the fifth littoral state) maintains its neutrality in the debate. The negotiations are still under way.

Besides the various channels of open economic and legal pressure, Russia uses domestic instability in Azerbaijan and Kazakhstan in order to influence their decisions. Because political instability takes different forms in the two states, the actual levers Russia uses in dealing with Kazakhstan and Azerbaijan also differ significantly. In Azerbaijan, it is the war with Armenians and intense domestic power struggle that provide Russia with political leverage. In Kazakhstan it is the ethnic card that Russia successfully plays out, because about 32 percent of the republic's population are ethnic Russians. The concentration of ethnic Russians in western Kazakhstan, the major oil-producing region, further complicates the problem.

The Kazakhstani President Nazarbaev and the Azerbaijani President Aliev, two former Communist bosses, now face the same challenge — to preserve their states' survival as sovereign entities — but this fundamental task acquires different forms in Kazakhstan and Azerbaijan. To the Kazak leader, preserving an independent Kazak state means finding a workable solution for the republic's "Russian problem." The main domestic pressure on the Kazak government comes from the Russian-speaking population. In Azerbaijan, the main problem is resolving the Karabakh conflict. To stay in power, Aliev needs to end the war imposing severe constraints on all government actions.

Oil is at the heart of the problem in both cases, because it ties together these domestic pressures with Russia's economic and political interests in the region. The centrality of oil and the oil industry to the strategies of economic recovery in both Kazakhstan and Azerbaijan determines the critical importance of events taking place in this sector for their development. Oil is also that powerful interest that drives the actions of other international actors influencing the process of economic policymaking in Kazakhstan and Azerbaijan. Whether or not these republics will be able to take full advantage of their oil resources will, to a large extent, determine whether or not they will survive as sovereign and independent states, and vice versa.

To date, the issues of oil politics in central Asia and Azerbaijan have not been examined seriously in the academic literature. Although there is

a considerable interest in the developments in this sphere, their coverage is mostly confined to a “matter-of-fact” record of events. In part, this lack of the theoretical literature on the subject can be explained by the relatively recent and largely inconclusive character of the processes taking place in this sphere.

It is impossible to do justice to this extremely complicated problem in one chapter. The political struggle for control over Caspian oil, with all its thriller-like qualities, merits a comprehensive study of its own. The goal of this chapter simply is to highlight the importance of the nature of the resource in question as the fundamental factor underlying these complex political negotiations. Oil is a unique resource, but it is precisely this uniqueness that often is overlooked by the students of oil politics in the post-Soviet space. This chapter attempts to sketch out a different approach to the problem, one that focuses on the role of nature, geography, technology, and other factors that often are overshadowed by power politics.

PHYSICAL CHARACTERISTICS OF OIL AND ORGANIZATION OF OIL INDUSTRY

There is a great temptation, especially for a political scientist, to treat the whole process of negotiating oil deals in post-Soviet states as purely politics-driven. From the narrative presented above, it is easy to conclude that political interests of various actors — Russia’s geopolitical ambitions, Kazak and Azerbaijani governments’ search for actual political independence from Russia, Iran’s and Turkey’s pursuit of political leadership within the region — are all that matters.

There is hardly any doubt that all these factors play very significant roles in shaping the outcomes of the bargaining process in these two cases. However, an analysis exclusively focused on the details of political bargaining comes dangerously close to committing a fallacy of excessive voluntarism. Such an approach may lead to serious overestimation of the actors’ abilities to pursue various policies and, thus, fail to capture the real complexity of the process under consideration.

For one thing, despite the fascinating interplay of the political, historical, and ideological forces, the market factors remain crucial. The structure and dynamics of the international oil market fundamentally determine the interests of the actors involved, as well as the range of options available to them. Furthermore, the developmental and environmental outcomes of oil extraction, such as backward and forward linkages, spillovers to other economic activities, and environmental costs, ultimately depend on how the industry is organized. Thus, for better

understanding, any particular political bargaining game must be analyzed within the broader context of the international oil industry.

It is the interaction of the natural, technological, economic, and geographic characteristics that is crucial for explaining the organization and functioning of the international oil industry. To be sure, bargaining strategies of the firms and states involved in the negotiations over oil remain very important. The question is, how do we incorporate nature, geography, technology, and economics into the analysis of oil politics.

To begin with, a thorough analysis of the bargaining process must acknowledge more explicitly that the industrial organization and market structure of the oil industry are fundamentally shaped by the physical characteristics of oil.

Bradford Barham, Stephen Bunker, and Denis O'Hearn (1994: 32–33) developed a very suggestive analytical framework that focuses on “three sets of factors as being crucial to the organization and operation outcome of a raw material industry: the resource characteristics, the technology of the industry, and the market structure.” All these factors are closely inter-related. However, it is the first two that fundamentally shape the oil market structure.

The Resource Characteristics

Oil is a relatively scarce resource. Relative scarcity is a complex variable that reflects its social use, availability of substitutes, geographic location, and concentration.

Social use is a basic characteristic of the raw material reflecting the specific patterns and scale of demand. Although some raw materials are fundamentally indispensable as industrial production inputs, others may be considered luxury goods. That affects the degree of elasticity of demand and, consequently, the tendency among the producers to raise prices by withholding supplies.

Oil is essential to economic activities, and the demand for it is eventually quite inelastic. Although the search for substitutes is underway, particularly since the 1973 crisis, the prospects for replacing oil as the primary source of energy in the near future are dim. Its strategic importance for functioning of modern economies determines the high degree of politicization of the industry. States, along with firms, are active strategic players in the oil game. Oil is simply too important to be left solely to blind market forces. In addition, potentially high rents make oil particularly attractive to governments of the countries where oil is found. In

oil-producing countries, oil is often the primary source of internal revenues and export earnings; this is particularly true of the developing countries.

Oil is not found everywhere; it is concentrated in a few sites. Oil differs in its chemical characteristics: it can be heavy or light (in terms of gravity, i.e., the weight relative to the weight of the same volume of water), sweet or sour (in terms of its sulfur content), and paraffinic or aromatic (in terms of the presence of saturated or unsaturated hydrocarbons). Light, sweet, paraffinic crudes are considered of a higher quality; they are less corrosive, burn cleaner, are easier to process, and contain a large proportion of gasoline elements. These crudes command premium price. Large reserves of such high-quality oil are very few, and this creates the possibility of extracting strategic rents.

Geographic location of prime sites also affects the oil market in important ways: it determines the relative scarcity of the resource for specific markets. Major consumer markets often are quite distant from the prime oil reserves, which determine specific transport requirements. The longer the distance to be covered, the higher the cost of moving oil to particular markets. "Thus, relative scarcity and the associated strategic opportunities also depend on transport costs and the spatial distribution of prime reserves relative to the main markets" (Barham, Bunker, & O'Hearn 1994: 23).

Relative scarcity affects industrial organization in very important ways. Above all, it creates "the fundamental struggle for rents both within the private sector and between the public and private sectors, especially between multinational companies and states in resource-rich regions" (Barham, Bunker, & O'Hearn 1994: 18).

The Technology of Extraction, Refining, and Transport

The oil industry is not particularly susceptible to rapid technological change. In principle, the technology of oil extraction has not changed dramatically since 1901, when Captain Anthony Lucas brought in Spindletop, the first gusher in the Western Hemisphere. The rotary drilling rig, as well as the use of fluid to sustain pressure in the well, were first used at Spindletop. Although modern drilling equipment is incomparably more complex, effective, and expensive, there are certain natural limits to how oil can be extracted.

On the other hand, the importance of technological innovation in the oil industry should not be underestimated. As the best and most

conveniently situated oil reserves are being depleted, oil companies are pushed to bring into production new sites, most of which are much more difficult to develop. By allowing oil companies to drill deeper and to move into more geographically remote areas, modern technology makes possible recovery of oil from previously inaccessible reserves.

Exploration and extraction of oil are capital-intensive and require limited amounts of often highly skilled labor. Thus, by the mid-1980s, the cost of bringing into production an average well was about \$400,000, while that of an offshore or Arctic well was more than \$10 million (Anderson 1984: 266). Offshore drilling is particularly expensive. It requires constructing jack-up platforms (huge floating structures) or using the drill ships, especially in deeper waters. Both platforms and ships are very expensive to build and extremely costly to operate. Offshore drilling, therefore, requires heavy investments, and not every company or every state has the capacity to conduct offshore operations.

The cost of extraction also depends fundamentally on the characteristics of the particular reserves: "Petroleum reserves are both unique and complex. Their fluids — oil, gas, and water — exist in an intimate relationship with one another. The character of the rock itself, the temperature and viscosity of the fluids, the pressure, and even the shape of the reservoir all profoundly influence fluid behavior, principally the manner in which fluids move through the reservoir rock toward a well bore" (Anderson 1984: 168).

Chemistry and viscosity of oil significantly affect the costs of extraction. When the drill penetrates the formation rock, both the natural balance of fluids and the pressure change. Under these changed conditions, various metals, sulfur, and other ingredients found in the oil interact with other fluids and with the formation rock, and these reactions can produce various emulsions and make the oil more difficult to recover.

However, it is viscosity that is a particularly important factor determining the degree to which oil is easily recoverable. High-viscosity, or heavy, oil is very thick and does not flow easily. To make it flow, it is necessary not only to sustain higher pressure but also to raise the temperature in the well bore. Heavy oil, therefore, requires more expensive recovery techniques, like steam flooding to extract the oil. Because viscosity determines the degree to which oil continues to resist moving out, heavy oil is much more likely to become so-called residual oil, which can be recovered only through costly secondary and even tertiary methods. In general, only about 30 percent of the oil in the ground is recoverable by natural or primary methods. Therefore, it is extremely important not to damage the well bore and not to produce at a rate faster than this particular well bore

can sustain. The danger of overusing the well is that production will stop long before all recoverable oil is taken out. That determines the importance of conservation in order to prevent wasting such a valuable resource.

Various crude grades also determine the differences in refining. Most importantly, refining is specifically suited to various kinds of oil. Refineries generally are built for specific kinds of crude oil. This factor contributes to the vital significance of continuous crude supply: if supply is cut back, a refiner may be left with a very limited range of alternatives. Although in the last 10–15 years there has been a tendency to make refining more flexible, refineries generally remain very much dependent on a continuous supply of particular kinds of oil. That makes reliable and cheap transport crucial for operation of refineries.

Transport is a very significant issue in the oil industry. Because oil is concentrated in specific geographic locations and its value-to-volume ratio is low, the costs of transportation significantly affect the market price of oil and, thus, the level of rent appropriation. Moving the product to a marketplace as inexpensively as possible is the first priority in marketing. To put it simply, the buyer's main concern is "to find the right quality of material in the right quantity and in the right place to save transportation charges" (Anderson 1984: 272). Strategic geographic location is one of the most important factors in that respect.

Oil is moved by rail, sea, or pipeline. This diversity of potential transport means determines some of the important differences between the oil and gas industries, because gas can be moved only by pipeline (International Energy Agency 1994). Transporting oil by pipeline is more expensive than by sea but considerably cheaper than by rail. The first pipeline for transporting crude oil was constructed in western Pennsylvania in 1865, but it was only after World War II that pipelines became the primary way of transporting oil and gas.

Pipeline transportation has a number of very peculiar characteristics: high investment costs, a high degree of inflexibility, and significant economies of scale. Once the pipeline is built, its route cannot be changed — it is a fixed and highly product-specific investment. Although the same is true of railroads, a railroad generally can be used for carrying a wide variety of cargoes. Pipeline transportation, on the other hand, is extremely inflexible in that sense; it is characterized by the highest degree of product specificity. Even refurbishing an oil pipeline for transporting natural gas is a very expensive undertaking: construction of compressors along the pipeline alone would incur high additional costs. Moreover, the specific design of a pipeline depends on the type and the quantities of oil to

be shipped through it. Therefore, reliable supply and demand must be assured at appropriate locations. Given the costs and inflexibility of pipeline transportation, planning is critical in designing and operating a pipeline. It is vital to carefully choose the route of a pipeline and determine the location of the terminal and loading facilities before the actual construction begins.

Operation of a pipeline also poses some peculiar problems. Pipeline transportation is "unique in the sense that material moved provides the transport medium. Once in motion, the fluids push themselves through the line" (Anderson 1984: 201). To be able to operate, a pipeline must be completely filled, which takes a lot of time and oil. A guaranteed minimum throughput is absolutely crucial in terms of returns on investment; fully utilizing a pipeline's capacity is particularly important because of its huge sunk costs. Any interruption of the flow of oil through the system is a tremendous loss of money. The whole system of pipeline transportation is fundamentally based on the smooth flow of the crude.

Oil does not flow continuously; it is moved in batches that are accumulated in advance. The system allows a pipeline operator to transport batches of oil belonging to different owners. In that situation, scheduling and recordkeeping become crucial. In general, maintenance of an operating pipeline is very important, particularly if the crude contains highly corrosive elements. Regular inspections and control are crucial for preventing leaks and dangerous accidents. Nevertheless, operation costs generally constitute a small percentage of the total investment in a pipeline; the bulk of its cost is a front-end capital investment.

Financing is the key element in the development of oil transportation infrastructure. Construction of a major pipeline is an extremely expensive project, depending on the length of a pipeline, its throughput capacity, terrain, rights of way, and other factors. Quite often, it takes several companies, private and state owned, to ensure financing for a pipeline construction project.

A particularly complex set of problems arises when a pipeline crosses international borders. From a financial standpoint, the cost of such a project increases as a result of transit fees. Even more importantly, transboundary pipelines invariably introduce various legal and political factors, including security considerations. Being extremely sensitive to interruptions in the flow of oil, transboundary pipelines are particularly vulnerable to various forms of sabotage. The degree of political stability in the countries whose territories a pipeline crosses acquires particular importance in that respect.

The Market Structure

The Nature of Competition: Oligopolistic Market

The oil market is oligopolistically structured. The oil industry is not self-adjusting, as the proponents of perfect market competition would like it to be. In energy industries, “the prevalence of the investment element does result in a quest for security of tenure, which only some degree of market control can provide” (Frankel 1989: 43). Historically, there has been a strong tendency in the oil industry toward creation of large vertically integrated and geographically diversified firms. Thus, up until the mid-1970s, the Seven Sisters, seven major transnational oil corporations — Amoco, Royal Dutch/Shell, Exxon, Chevron, Texaco, BP, Mobil — controlled almost the whole oil market in the world, while a large number of Independents (some of which are also quite large and vertically integrated and conduct worldwide operations) always have been struggling for access to oil reserves and markets.

Huge fixed costs, highly product-specific investment, economies of scale — all these factors made entry to the oil market much harder for smaller, nonintegrated firms. As Brian Levy (1982: 115) describes the logic of vertical integration:

High fixed costs and economies of scale led firms upstream to attach great importance to stable markets downstream, and led refiners downstream to place a premium on securing a continuous flow of crude. Furthermore, the presence of only a small number of buyers and sellers created an incentive to achieve this stability by means of vertical integration. Vertically integrated firms could avoid the expense and uncertainty of bargaining for raw materials on intermediate markets; they could also avoid the risk of being dependent on potential competitors for supplies of raw materials; and they could perhaps even reap a competitive advantage over any nonintegrated competitors downstream in times of scarce crude supply.

In a highly volatile oil market, the companies’ goal has always been to secure a constant supply of crude, as well as outlets for refined products. However, high fixed costs in production and transport of oil, as well as the peculiarities of refining that is designed for specific kinds of oil, are only part of an explanation. A more careful analysis of some of the physical characteristics of oil may help to illuminate why vertical integration and oligopolistic market control are particularly important in the international oil industry.

Oil is extracted, moved, processed, and sold in very large volumes. There is a continuous demand for oil, which is burned constantly in every corner of the world. It is vital that refineries never stop producing gasoline, fuel oils, and so on. In order to be competitive and lower their operating costs, refiners have to strive to increase their throughput. Fundamentally, it is a flow system: oil is not supposed to stand still, because it does not earn money that way. Moreover, huge volumes of oil make the costs of warehouse storage exceedingly high. Therefore, the supply network has a limited storage capacity: to remain competitive, an efficient operator can afford hardly more than about two weeks of working inventory.

Thus, the significance of uninterrupted supply in oil industry is hard to overestimate. "Despite petroleum's large volumes, producers and refiners strive to match supply to demand and hold inventories at a safe minimum. If inventory creeps upward, they lose money" (Anderson 1984: 277). The system, therefore, is very sensitive to any fluctuations and disruptions of supply. For the same reasons, it is extremely important to secure outlets for refined products.

In their search for stability and order in such a system, with its built-in self-destructive tendencies, big companies established an oligopolistic form of cooperation. In spite of antitrust legislature, oligopolistic oil firms have been able to maintain their cooperation. Since the beginning of the century, the oil companies have been very creative in inventing and maintaining various instruments of reinforcing the discipline within this oligopolistic framework (Moran 1987).

After the 1973 crisis, and particularly in the 1980s and 1990s, the oil market structure began to change in some important ways. Although large-scale oil companies still occupy a central place in the market, they no longer control the "commanding heights." To a great extent, they do not act as a unified group any more. Independent firms and government-owned enterprises have become much more assertive in the international oil industry.

However, along with growing competitiveness in the oil market, the degree of uncertainty also is increasing. The recently founded futures market can only partly offset such increasing volatility. As Paul Frankel argues, "[T]he need for some sort of overall management is so strong that there is every likelihood that somewhere or other there will reemerge, now and again, forces bent on securing a degree of continuity, which is the only way of providing the incentive for investment" (Frankel 1989: 44). At present, the Organization of Petroleum Exporting Countries (OPEC) (despite its numerous organizational weaknesses) provides some

guarantee of market stability. Saudi Arabia's enormous reserves are the most important stabilizing factor.

The Issues of Control and Contractual Relationships

As Barham, Bunker, and O'Hearn (1994: 30) emphasize, including these factors into an analysis extends the definition of the market structure: "The control question arises from the observation that, in many raw material industries, the owner of the resource does not directly manage the extraction and refining of the material." High levels of rent appropriation make the oil industry particularly attractive to governments of producing countries. They enter negotiations with the oil companies, but this relationship is characterized by constant internal struggle for a larger share of profits. Because both actors need each other, their cooperation is a highly politicized process of bargaining and conflict.

The issues of ownership and regulation are very important in this respect. The wave of nationalizations of oil industries that swept the Third World in the late 1960s and early 1970s marked a fundamental shift of power from the multinationals to the host governments. The era of concessions in the oil industry came to an end. National governments, driven primarily by the desire for higher rents, entered the international oil market as independent producers. As a result, the whole market began to change. Although nationalization often entailed serious negative consequences for the host country (what Michael Shafer [1983: 95–96] calls "loss of insulation"), the power of the oligopolistic corporations was dramatically shattered.

There are three main types of state control over national oil operations (Klapp 1987).

Revenue control. Taxation is the primary form of controlling oil revenues. In addition to corporate income taxes and royalties paid on production, the state can insist on receiving area fees for exploration, cash bonuses, and other kinds of payments from the oil companies. The ability to change taxation policy is a valuable bargaining chip in the hands of the host government. States also can exercise revenue control by expanding their investment in the public oil sector. However, such efforts usually are accompanied by creation of a large public debt, which gives foreign banks a considerable measure of financial control over the host government.

Management control and operational control. The government also can assert its presence in the oil sector by interfering in the private management of the industry, including by setting production ceilings and establishing bidding practices. These forms of intervention give the state

more direct control over decision making in the oil sector than taxation. The state also can establish performance, environmental, and operational safety regulations that reduce the companies' freedom to determine the specific conditions under which production and processing of crude will occur.

Ownership control. Through various forms of equity participation, the government can secure a direct share of the profits from producing, processing, and distributing oil. Cooperation with the multinationals can take a variety of forms — profit-sharing contracts, carried-interest agreements, joint ventures, production sharing, and service contracts. The differences between them concern mainly the forms of sharing costs, profits, managerial responsibilities, and ownership of the oil supplies between the government and the companies.

The states, however, do not enter the international oil market as a single, undifferentiated player. They also come into conflict with each other. One fundamental divide is between the producer states and the consumer states. Producer states generally are interested in pushing up the prices and cutting back the production of their oil. The governments of major petroleum-consuming countries, on the contrary, pursue policies aimed at keeping oil prices lower.

Another conflict arises among the producing states themselves. Although OPEC's success in the early 1970s was largely because of its member-states' ability to act in a unified manner, those days are long gone. As oil prices fell, it became clear that OPEC lacks the effective mechanisms for reinforcing cooperation. If, in times of shortage, the main conflict is between producer states and consumer states, in times of abundance, producing states turn against each other and start competing for market shares. Glut in the oil market and generally negative economic consequences of oil-based development strategies for most of the producing states explain why the bargaining power of the producing states has been eroding gradually since the late 1970s. In effect, the oil companies managed to retain control of the industry, although the number of the players in the field has greatly increased during the last decades.

In these changing market conditions characterized by more diversity and competitiveness, the need for ensuring stability of contracts is particularly strong. Given the high volatility of the oil market, it is hard to overestimate the importance of developing some institutional means of enforcing the rules. In the oil industry, cooperation is both crucial and very difficult to maintain.

Kazakhstan and Azerbaijan are entering the international oil market in this period of depressed oil prices and eroding oligopolistic control; this

timing fundamentally shapes both their choices and constraints. On the one hand, they can negotiate with a greater number of potential partners among the multinational oil companies. On the other hand, pumping Caspian oil is not as strategically important as it could have been in a time of shortage in the market. The whole process of negotiating oil contracts is bound to be more complex and subtle in this situation.

The cases of Kazakhstan and Azerbaijan also help to illuminate the centrality of control of transport in the oil industry. One of the fundamental features of the pipeline transportation is the increased significance of cooperation among the pipeline operators, the sellers, and the buyers of oil. Each of these actors holds a certain amount of power stemming from their respective positions in the oil chain, but they ultimately depend on each other for the continuous flow of oil and money. Transporting oil through third countries tends to exacerbate the problem of cooperation by introducing important geopolitical elements into the behavior of the actors.

Every major transboundary oil pipeline presents a potential security problem for producing and consuming states as well. For a transit country, on the other hand, a pipeline is not only a source of lucrative revenues in the form of various fees and taxes but also an important instrument of political influence. Examples of political manipulation of the pipeline power abound, especially in the Middle East, where oil and politics have always been closely intertwined: "Practically, throughout the existence of the oil transportation systems in the Middle East, some of the transporting countries interrupted the flow of the oil, sabotaged and confiscated the lines, their equipment and facilities on hand, and periodically closed the Suez Canal for tankers. Continuous negotiations were carried on between the pipeline companies and the transporting countries about transit fees and loading and terminal tolls" (Shwadran 1977: 36).

Syria was particularly notorious for sabotaging two major pipelines connecting Iraq and Saudi Arabia with the Mediterranean — the Iraq Petroleum Company pipeline and Aramco's Trans-Arabian Pipeline (Tapline). The Syrian government insistently demanded constant increases in the transit fees and, during the 1956 Suez crisis, shut down the Iraq Petroleum Company pipeline for an extended period of time, thus, causing Iraq a significant loss of revenues. In May 1970, when the Tapline was sabotaged in the Golan Heights, the Syrian government refused permission to repair the damage. The permission was granted only after Tapline agreed to increase the annual transit fees and pay a large settlement bonus (Shwadran 1977: 39–41). The constant threat of sabotage made Iraq and Saudi Arabia seek alternative routes for transporting their oil. In the

1970s, Iraq built a number of “strategic” pipelines bypassing Syrian territory — one linking its northern oil fields to its southern terminals on the Persian Gulf, another via Turkey to the Mediterranean ports, and yet another across Saudi Arabia to the Red Sea (Hartshorn 1993: 190). Given the physical vulnerability of pipelines, expanding one’s export options is necessary to increase the security of the flow of oil to the markets and avoid an excessive concentration of control in the hands of a third country.

A transborder oil pipeline may become a source of tension even between the friendliest neighbors, as was demonstrated by the debate over the transportation of Alaskan oil in the early 1970s. To a great extent, it was the fear of potential dependence on a foreign country that made the U.S. government so reluctant to build a trans-Canadian pipeline, in spite of its many advantages, both in terms of economic rationality and environmental safety, over the trans-Alaskan pipeline connecting Prudhoe Bay with the southern Alaska port of Valdez (Gicchetti 1972; Berry 1975). A trans-Canadian pipeline would not only incur additional transit costs but also allow Canada to control the flow of Alaskan oil. The United States did not want to bring additional players (particularly ones with such high political leverage) into the already intense political struggle for the oil rents that involved the Alaskan natives, the federal and state governments, the oil companies, and various other interest groups. The choice of the pipeline route was fundamentally a political decision.

The geopolitical aspect of pipeline transportation is particularly important for the landlocked oil-exporting countries, such as Kazakhstan and Azerbaijan. The landlocked location magnifies the political and economic effects of the control of pipelines linking these producers to the sea terminals. The range of transportation choices available to these countries is inherently limited: one way or the other, their oil is bound to flow through the foreign territory. Accordingly, the bargaining power of the transporting country increases. Thus, lack of direct access to the sea significantly shapes the whole dynamics of regional politics and puts the issue of oil transport in the very center of geopolitical struggle.

OIL NEGOTIATIONS IN KAZAKHSTAN AND AZERBAIJAN: POLITICS, AND WHAT DRIVES IT

The narrative of the events in Kazakhstan and Azerbaijan invites some questions about the driving forces behind the main actors’ behavior. What are the host governments’ bargaining positions? Why are the multinational companies so persistent in their struggle for the Kazak and Azerbaijani

oil? Why is Russia so aggressively involved, especially in the pipeline negotiations? How much can be explained by her political and ideological goals, as opposed to economic interests?

The Host Governments' Bargaining Positions

As newly independent states, facing the enormously challenging tasks of economic restructuring, political reform, and state and nation building, Kazakhstan and Azerbaijan see in their rich petroleum reserves their ticket into the prosperous future. In both cases, the idea of oil-based development is viewed as an effective solution to economic problems and the principal means for achieving real economic and political independence from Russia.

Although the Kazak and Azerbaijani oil reserves are very substantial, the physical characteristics of their oil and its geographic location impose significant constraints upon these countries' abilities to actually benefit from their petroleum resources.

All supergiant fields — Tenghiz and Karachaganak in Kazakhstan, Azer, Chirag, and Gyuneshli in Azerbaijan — are very costly to develop and operate. The Caspian hydrocarbon resources are unique in their geological characteristics, the quality and composition of their oil and gas. Characterized by very high sulfur content and high reactivity of the concentrated components, Caspian oil lies deep under anomalously high pressures and extreme temperatures. These deposits, therefore, require very sophisticated and expensive technologies for extraction and processing.

Moreover, the three major Azerbaijani fields are located far offshore in the Caspian Sea, and their highly sulfurous oil lies deep under the water. Accordingly, the costs of extracting and processing oil from these fields are extremely high. Drilling offshore also requires a state-of-the-art technology. Marine pipelines, necessary in order to move oil from the drilling site to the shore where it is processed, are exceedingly expensive. Because both Kazakhstan and Azerbaijan are landlocked, construction of a major pipeline is required, and the costs of this project are also well beyond these countries' means.

Thus, the physical characteristics of oil and its geographic location explain the particularly high degree of Kazakhstan's and Azerbaijan's dependence on the multinational oil companies. In order to develop their oil reserves, Kazakhstan and Azerbaijan need to secure generous foreign investments. Without the companies' capital, technology, expertise, and marketing power, these states will never be able to profit from their oil.

Well aware of this need to attract investors, both governments took negotiations with the companies very seriously. The negotiations were highly centralized, with the decision-making authority concentrated directly in the hands of President Aliev in Azerbaijan and President Nazarbaev in Kazakhstan. In both countries, the legal environment is friendly to foreign investment. These factors definitely improved these governments' bargaining positions.

However, their real bargaining power depends on a variety of other factors. First, it reflects these states' institutional capacity to conduct negotiations and implement decisions. In the situation of political and economic transition, such capacity is quite limited. Widespread corruption and inefficiency also weaken the state.

Both governments also experience an urgent need for hard currency, which can come only from oil sales. Strong revenue pressures significantly weaken Kazakhstan's and Azerbaijan's position vis-à-vis the multinationals. These newly independent states desperately need money, and the pressures of the moment may be strong enough for them to forego some of the long-term gains in exchange for the immediate benefits. This also applies to their relations with the Russian government and the newly formed Russian oil conglomerates seeking participation in the development of lucrative Caspian reserves. Time is often a crucial factor in negotiations, and this is precisely what the governments of Kazakhstan and Azerbaijan cannot afford.

Geography also imposes very significant constraints upon these governments' decision making. Because of the peculiar physical characteristics of oil, the specific transport arrangements are of utmost importance to the producing country if it wants to benefit from oil export. This is particularly true of landlocked producers, such as Kazakhstan and Azerbaijan. Although there is always a potential tension between oil producers and transporters, the situations of Kazakhstan and Azerbaijan are unique in many respects. Above all, the existing system of oil transport is practically fully monopolized by one neighboring country, which also happens to be a former metropole: Russia. The flow of oil in and out of Kazakhstan and Azerbaijan is controlled by the Russian pipeline operator *Transneft*, which introduced the system of export quotas, and these quotas are being used as a very effective tool of economic coercion for political purposes. Kazakhstan is particularly vulnerable to this sort of pressure. Thus, *Transneft* practically cut off Kazakhstan's export quotas in the past two years, claiming that highly sulfurous Tenghiz crude is causing corrosion of the pipeline. Unable to get oil out of Tenghiz, Chevron was forced to

cut its 1995 investment plan from \$500 million to a mere \$50 million, which was a significant setback in the development of Tenghiz.

The problem is further aggravated by the fact that Tenghiz is a producing field, and it is too expensive to shut down oil production on such a large scale. Thus, Kazakhstan is caught in the middle of a very difficult situation: it is impossible to stop pumping oil, it is impossible to get it out to the customer, and it is impossible to store it locally. Various swap agreements are only a temporary and often politically untenable solution. This is why the Kazak government eventually had to give in to many of Russia's demands, including giving a 20 percent stake in the Tenghiz contract to the Russian oil giant LUKoil. By comparison, Azerbaijan did not experience the pressure of time to the same degree, because its major offshore fields are not in full production yet and the "early oil" is expected to flow only by the end of 1997. Thus, the Azerbaijani negotiators could afford to wait and bargain with Russia. The "two-track" pipeline decision was, to a large extent, a result of this broader leeway in their negotiating strategy.

This rather brief analysis of Kazakhstan's and Azerbaijan's bargaining positions demonstrates how the physical, locational, technological, and economic characteristics of their oil reserves, as well as peculiarities of the post-Soviet transition, restrain these countries' ability to fully benefit from their oil wealth. Though sovereign owners of the resource, these countries are relatively weak players, particularly vis-à-vis Russia.

Most importantly, however, their bargaining power depends on the ultimate value of their oil to the multinational companies. How much do the companies really need Kazak and Azerbaijani oil? This is the crucial question.

The Interests of the Companies in Kazak and Azerbaijani Oil

Multinational oil companies often are viewed as the embodiment of the economic power and vital interests of the West; however, Western governments are said to be political representatives of the interests of the capital. Various forms of anticolonial ideology and, particularly, Marxist political thought traditionally emphasize this convergence between the interests of the state and the capital. From that perspective, in order to understand what the multinationals want in Kazakhstan and Azerbaijan, one should look at the strategic interests of the West in the Caspian region. To the United States and western Europe, the petroleum-rich Caspian Basin is a potential alternative to the politically volatile and unstable

Middle East as a primary source of oil supply. This is certainly a very important reason behind the companies' vigorous attempts to establish themselves in the Caspian, as well as the Western governments' active lobbying efforts in this area.

However, a number of studies have argued that Western governments do not always formulate their foreign policy goals on the basis of the interests of their companies. The multinational companies, in turn, do not automatically "represent" their home governments in their global activities (Krasner 1978; Turner 1978). Although oil and politics are inseparable, the interests of the oil companies are fundamentally determined by the market structure and organization of the international oil industry. It is this basic fact that often is overlooked by political analysts trying to explain the events in the Caspian region.

In an oligopolistic market, securing exclusive or privileged access to reserves acquires strategic importance. Creating excess capacity as a barrier to entry is the way to ensure higher differential rents. From an oligopolist's viewpoint, "uncaptured" reserves threaten this situation with major disruption of the market.

As many historical analyses of the oil industry demonstrate, the need to incorporate new vast reserves into the oligopolistically controlled market poses the greatest challenge to the multinationals. Theodore Moran (1987) brilliantly tells the story of the major oil companies' efforts to accommodate new production in the Middle East without disrupting the prices.

After the collapse of the former Soviet Union, Russia has become a potential new entrant into the oil market, one with huge production potential (about 400 million tons per year). Given the high degree of political uncertainty and economic chaos in Russia, there is always a possibility of Russia disrupting the international market by flooding it with cheap oil. The oligopolistic oil market dictates the necessity to offset the potentially disruptive effect of the collapse of the Soviet Union on the world oil prices. Thus, the behavior of the multinational companies in Kazakhstan and Azerbaijan can be explained as part of their strategy aimed at incorporating new reserves into the existing oil market structure.

Multinational oil firms have been trying to get into the Russian oil sector since the Mikhail Gorbachev years. They continue to seek agreements with the Russians on developing, above all, enormously rich western Siberian oil fields. However, so far, they have not been able to achieve their goal. The Russian government, as well as the oilmen, are driven by nationalism. They do not want to "sell off" their national petroleum wealth to the Westerners, because it would mean giving up Russia's status as a superpower (or, to put it more mildly, her potential to regain such

status). Although the Russian oil industry is in very bad shape, both financially and technologically, and some Western companies were able to get minor deals, the government imposed a practically unbearable tax regime upon them. In general, the climate for foreign investment in the Russian oil industry is very hostile.

After the collapse of the Soviet Union, a number of privately owned, vertically integrated oil conglomerates emerged in Russia and quickly became major players in Russian politics. The largest and most ambitious among them is LUKoil, claiming to be able to swallow Exxon by the early twenty-first century. These Russian companies view the Western firms as their competitors and try to keep their participation in developing Russia's hydrocarbon resources at the minimum level.

In that situation, getting into the neighboring oil-producing states acquires a particular strategic significance for the multinationals. For one thing, it is one of the oldest strategies in the oil industry: to establish one's presence in the geographic areas close to or dominated by the competitor — Russia, in this case. Signing contracts with the Kazak and Azerbaijani governments greatly increased the multinationals' bargaining position in relation to Russia.

Given the recent trends toward more competitiveness and less certainty in the world oil market, it also seems to be a prudent step in terms of geographic and regional diversification of these companies' crude supply. In addition, Kazakhstan and Azerbaijan are geographically closer to the major oil markets than the western Siberian fields. Extracting and transporting oil is also much easier and cheaper here than in Siberia, with its extremely harsh climate and remarkably low ratio of population to territory.

Also, the post-1973 international oil market is witnessing a shift in power away from the major oil companies. Under such circumstances, the need for supplies of crude may become very important. In the absence of the necessary information, one can only speculate on this issue. Most likely, both factors are important — oligopolistic capturing of the reserves and an increase in physical supply of crude oil.

Probably, the most reliable indicator, in this case, would be the degree to which the companies are actually determined to push the pipeline project. Another indicator would be the size of their actual investment in exploration, drilling, processing, and transport of oil in Kazakhstan and Azerbaijan. These factors may point in the direction of the importance of oil *per se* for the companies.

The main problem with testing the hypothesis is lack of relevant information. In addition, even if the companies are determined to invest in

production and transport, it may be that there is not much they can do. The companies have to operate within the area under the legal and administrative jurisdiction of the sovereign states. All reserves in Azerbaijan and Kazakhstan are state owned, and the old Soviet tradition of highly centralized political and economic control only reinforces these states' determination to exercise full control over their natural resources. Virtual absence of the domestic private business sector leaves Western companies without potential allies whose support could have made negotiations easier for the companies.

The companies' political leverage in the bargaining process also is limited, particularly with Russia's active involvement in the overall political game. There are limits to what the multinational companies can offer the host governments, because no company's financial capacities are unlimited. In contrast, the range of various instruments of political manipulation available to Russia is extremely wide. Russia's interest in Caspian oil is one of the most important factors explaining what is going on in the region.

Russia's Interests: Why Is the Pipeline Route So Vitally Important?

At first glance, the answer seems obvious: Russia is interested in controlling the oil and gas flow from Kazakhstan and Azerbaijan for economic reasons — in order to profit from their oil deals (transit fees, equity shares, and so on), as well as prevent these two potential competitors from undermining Russia's position in international markets. Certainly, these objectives play a very important role in determining Russia's position, particularly because Russia's own oil production is declining and her richest western Siberian reserves are rapidly depleting.

On the other hand, Kazakhstan and Azerbaijan, whose combined annual output is less than 40 million tons of oil, hardly pose an immediate threat to Russia, who produces about 400 million tons of oil each year. Even if they do rapidly increase their output, it may take a very long time before they will be able to challenge Russia in the oil market.

A second common-sense explanation is that Russia's behavior is driven by her desire to retain economic and political control over the former colonies. This argument is certainly very true. The inertia of imperial thinking is not likely to be overcome in the near future, especially given the current shift in political power toward the explicitly nationalist and conservative political forces.

Although both explanations point to very important economic and political factors defining Russia's policy toward Kazakhstan and Azerbaijan in the sphere of oil development, they tend to lose focus in answering the question, why is the pipeline route of such critical importance to Russia. In essence, it is a very simple situation: whoever controls the pipeline controls the flow of the most important resource in the region. By turning the switch, a pipeline operator can stop that flow, and the producer will have to either shut down production or agree to new conditions put forward by an operator. The Russian pipeline operator *Transneft* actively uses this weapon against Kazakhstan, which caused the latter a substantial fall in oil production in recent years.

Thus, the monopoly of control over the pipeline system would give Russia the ultimate instrument of controlling the decision making in Kazakhstan and Azerbaijan, both in their domestic affairs and foreign policies, without reconstituting a burdensome formal empire. In that sense, Russia is engaged in a very different project — redefining her hegemony in the former colonial space through control of the transport of oil. As Bunker and Paul Ciccantell (in press) argue, control of transport has always been the key element of every successful hegemonic project. From this perspective, Russia's efforts to build a new pipeline through her territory reflect the larger strategy of hegemonic ascendancy.

This approach explains not only Russia's behavior but also the behavior of Iran and Turkey. All these countries are striving for hegemony within a regional subsystem. How the transport system is organized fundamentally determines how these various states relate to each other. Ultimately, not only patterns of regional integration and distribution of rents but also domestic politics, or what could be called a "coloration" of domestic political regime, depend on which way pipelines will go and who controls the switch. For instance, if the Turkish route is chosen, both Kazakhstan and Azerbaijan will have more incentives and opportunities to revive and reinforce their Turkic cultural heritage as well as to reduce the influence of Russian culture in their domestic arena, and this would have a series of significant consequences for the whole region.

What needs to be stated explicitly is this pivotal role of the ultimate pipeline configuration in shaping the face of the Caspian region in the long run. Taking into account the centrality of controlling transport in a hegemonic project links together all these interconnected factors — the nature of the resource, geographic location, economics, legal arrangements, and politics — and helps to reveal the fundamental logic behind the complexity of the multilayered geopolitical game going on in the region.

CONCLUSION

As Daniel Yergin (1992: 13) said, oil is “a commodity intimately intertwined with national strategies and global politics and power.” Oil brings wealth and power to those who have control over it.

However, behind this veil of politics, there are more fundamental natural factors that make oil what it is. The basic characteristics of oil as a raw material (its relative scarcity, availability of substitutes, geographic concentration, and location), the technology of the oil industry, and the structure of the oil market — these three factors fundamentally shape the organization of the international oil industry. As this chapter attempted to demonstrate, many political decisions and choices are, in effect, determined by these nonpolitical factors.

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10

Bulk Flow Systems and Globalization

Robert P. Clark

In 1996, a year of unprecedented electoral activity around the world, voters from New Hampshire to Moscow are being told that their new enemy is something called the “global economy” or “global culture” or sometimes just “globalism” (Friedman 1996). That we now live virtually every moment of our lives within a matrix of global institutions is so much taken for granted that it has, for many of us, reached the cognitive level Michael Polanyi (1966) called the “tacit dimension,” wherein we have learned or internalized a perspective so well that we cease to be aware of it. Viewing the new global paradigm this way, however, blinds us to two important facts: first, the process of globalization has been going on for a very long time indeed; second, it has been a difficult, expensive, and arduous endeavor whose “success” (if we can call it that) was far from assured.

I believe that we have been compelled to become a global species since our primordial beginnings, and I discuss seven episodes in that process, from the remote origins of hominids in East Africa several million years ago to the Information Age. We could not have made such a journey, however, without bulk flow systems; and the crucial role of such systems in globalization forms the central theme of this chapter. After reviewing the reasons why we have been compelled to spread across the earth and summarizing briefly why bulk flow systems were essential in this process, I conclude by showing that global expansion is, in the very long

run, self-defeating, largely because of the positive feedback loop between human populations and the bulk flow systems on which they depend.

DIFFUSION AND BULK FLOW

“The one true test of all living systems,” writes James Beniger (1986: 64), “is the persistence of (their) organization counter to entropy.” Complex adaptive systems, including virtually all systems that contain living things, must deal continually with their own entropic tendencies, that is, the tendency of their own activities to render energy unavailable for future use. Since the mid-nineteenth century, we have understood that all systems exhibit an inevitable tendency to deteriorate or decay, to lose energy, or simply to “run down” (Fenn 1982; Cardwell 1971; Stehle 1994: 27–33; Davies & Gribbin 1992: 122–134; Prigogine & Stengers 1984). Systems possessing order and information tend inevitably toward disorder and meaninglessness. Each time a system performs work, a certain portion of the energy held within the system is liberated and, thus, becomes unavailable for future use. This process is inescapable and irreversible; once energy has been liberated from the structure of matter, it is “lost” to us forever. Of course, the energy still exists somewhere in the universe, but it is dispersed in ways that make it unavailable to us.

Our understanding of this phenomenon is based on the two laws of thermodynamics as formulated by Rudolf Clausius in the 1860s: first, that energy in the universe is a constant and, second, that entropy in the universe increases to a maximum. Although energy cannot be destroyed, it can be changed in form. Each time energy is changed from one form to another, however, a penalty is exacted: the loss of some quantity of energy that otherwise might have been available for work in the future. Clausius coined the term “entropy” as the measure of the amount of energy no longer available for conversion into work. Since Clausius, “entropy” also has been used to mean the degree of disorder or disorganization, or the loss of information or meaning, in a complex system. The tendencies of any system toward energy loss, decay, and disorder are referred to as “entropic tendencies.”

If all systems tend toward energy loss, decay, and disorder, how is it possible to create and maintain systems as complex and large as, say, a great city? How can cities grow and prosper when the laws of thermodynamics say they should be decaying? The answer to these questions, and the principal force compelling us to become global, lies in “dissipative structures.”

Civilizations, cities, indeed all large and complex systems, depend on dissipative structures. This term, coined by Ilya Prigogine, refers to the ability of complex systems to transfer their entropic costs to other parts of the universe (Nicolis & Prigogine 1989; Prigogine & Stengers 1984; Jantsch 1981). Dissipative structures enable complex systems to achieve and maintain a high level of order by dissipating their disorder, disorganization, and energy loss onto other systems. Some of these systems may be nearby; others may be on the other side of the country; still others, on the opposite side of the world. As Paul Davies and John Gribbin (1992: 125–128) put it, “in open systems entropy can decrease, but the increase in order in the open system is always paid for by a decrease in order (increase in entropy) somewhere else.”

Confronted with entropy, we have few options. One solution is simply to live surrounded by our own entropy, to put up with its costs. People who lived 20,000 years ago in the caves of northern Spain and southwestern France lived in the midst of their own entropy because they had no choice. They generated very little solid waste (for example, the remains of animals they had eaten), but what they did create was simply discarded in middens near the cave where they lived (Rowley-Conwy 1993: 62; Johanson, Johanson, & Edgar 1994: 273). They had no solid waste disposal problem because they had no technology to move waste to a distant sink (one very common dissipative structure).

Living with one's entropy is not an easy solution to maintain. It is speculated, for example, that the people of Easter Island eventually came to ruin because, having arrived on the island from Polynesian origins far to the west, they somehow lost the ability to leave, and the island became their prison (Ponting 1991). For a time, as they exploited the island's resource base, they flourished and their population grew. However, without the ability to import a distant energy source (another way of dissipating entropy), they ran up against the limits of the island's timber supply and fell into violence and decline. Thus, without the option of mobility, a group must practice considerable self-restraint in both numbers and lifestyle. This option requires that we sharply restrict both our population and our consumption levels, something that few of us are willing to accept if we have other alternatives.

Of course, we do have other alternatives. Historically, the first option was to use local resources and sinks to exhaustion and then move to fresh land. This alternative, seen in human behavior ever since our earliest ancestors began their long trek out of Africa, calls for the group to move from areas of resource scarcity and waste to areas of resource abundance and unspoiled landscape (Gamble 1994; Schusky 1989). Such a solution

leaves behind the entropic costs of the group's activities for the local ecosystem to absorb through its own recovery mechanisms. Slash-and-burn agriculture is one such technique still seen in many parts of the world today; pastoral nomadism is another.

Eventually, however, we ran out of fresh landscape, so our next option was to exploit local resources and sinks more extensively and intensively. Our objective here was to increase the quantity of matter, energy, and information available to human populations from nearby sources. One way to do this was to rearrange local resources to use them more intensively than is possible when they are in a natural state (domesticate animals and plants to regularize food supply) or to rearrange our waste so that the local ecosystem can absorb more of it (wastewater treatment). A second was to rearrange the local ecosystem to extract from it new resources not exploited before (switch from burning biomass to falling water as an energy supply) or to rearrange the local ecosystem so that it can absorb more waste (landfills). When this alternative reached its limits, we turned to the only other possible solution: to bring resources to us from far away, and send waste products to distant sinks. This option in all its variants has one simple goal: to move matter, energy, and information from where they are to where we want them to be (transport crude oil from Saudi Arabia to refineries in Houston) or to move waste from where it is created to a distant sink (dump toxic materials into the ocean).

Our situation is complicated enormously by the fact that our great needs for resources and sinks cannot be met by the earth in the sparse concentrations and unusable forms in which they occur naturally (Colinvaux 1978; Turk, Wittes, Wittes, & Turk 1975); and each solution we devised to solve this problem carried its own heavy costs associated with the creation, operation, and maintenance of increasingly large and complex systems. Thus, as we implemented various options for acquiring, processing, consuming, and disposing of resources, we inevitably created more entropy. The result was a cycle of challenge and response and, most significantly for this analysis, of expansion.

Complex human systems such as great cities consume huge quantities of critical resources, such as industrial energy, food, water, manufactured goods, and information, for which sources must be sought; and they produce huge quantities of goods, services, and wastes, including heat and garbage, for which markets and sinks must be found and maintained (Wolman 1966: 156–174; Trefil 1994). The more complex a system, the more inputs it needs simply to survive, let alone grow and prosper. Likewise, the more complex a system, the more wastes (the more entropy) it creates because of the additional resources it must expend simply to

coordinate and control itself (Tainter 1988). Thus, as cities grow, they must spread their networks of resources and waste disposal farther and farther afield, dissipating their entropy, or their costs, to others. As Lester Brown and Jodi Jacobson (1987: 35) put it, "cities require concentrations of food, water, and fuel on a scale not found in nature. Just as nature cannot concentrate the resources needed to support urban life, neither can it disperse the waste produced in cities. . . . Cities are . . . larger than their . . . boundaries might imply." What enables cities to grow larger than their boundaries are dissipative structures.

A dissipative structure is anything — a technology, a social process, a cultural practice, or an institutional arrangement — that shifts the entropic costs of a complex system from the persons and regions directly benefited to others far away in time or space (Jantsch 1981: 83). Our ability to dissipate entropy depends on the availability of technologies and organizations able to move large quantities of matter, energy, and information over great distances and at high speeds. Steven Vogel (1992) points out that all complex systems need to move resources in order to function and there are only two means of doing so: diffusion and bulk flow (Table 10.1).

Diffusion is the direct transfer of matter, energy, or information from one part of the system to another without intermediaries and without the necessity to package the material being moved. The transmission of information from one person to another via face-to-face communication is one example of diffusion; the pollination of plants by means of wind-carried seeds or pollen is another. Diffusion is satisfactory when speed is unimportant, distances to cover are small, and the objects to be moved are tiny.

TABLE 10.1
Diffusion and Bulk Flow Compared

	Diffusion	Bulk Flow
Speed	Slow	Fast
Distance	Limited to proximate	Long distance
Volume	Low	High
Cost	High	Low
Intermediary or linking technologies and institutions required	None	Containers, packing, loading, conveyance, unloading, unpacking

However, where distances are great, speed is critical, and quantities to be moved are large, diffusion is too slow and inefficient.

For the movement of large quantities over long distances at high speeds, bulk flow is required, but bulk flow requires the capacity to package the materials, load them into some container, transport the container, and unload and unpackage the materials at destination. This is as true for the circulatory system of a warm-blooded animal as it is for a nation's economy, a global information network such as the Internet, or the solid waste disposal system of a city.

Globalization was made possible by society's ability to fashion the bulk flow technologies necessary to move matter, energy, and information to virtually every inhabited space on the planet. These components include people (immigrants, refugees, tourists), manufactured goods (automobiles, clothing, television sets), services (insurance, data processing, accounting), raw materials (petroleum, iron ore, foodstuffs), information and images (news reports, entertainment, sporting events), cultural objects (film, television, music), financial capital (corporate stocks, national currencies, government bonds), technology (computers, steel mills, farming implements), and the waste created by production and consumption (air and water pollution, toxic substances, heat).

For many millennia, our ability to move matter, energy, and information around the planet was limited by three obstacles. The first of these was conceptual or "knowledge dependent," that is, first, human beings had to be conscious of the world as a single place (Zerubavel 1992; Blaut 1993; Berthon & Robinson 1991). This barrier began to lift about 1500, when Europeans established their first enduring connections with Western Hemisphere peoples and rudimentary global systems began to take shape. For about the next 300 years, from 1500 to 1800, materials could be moved increasingly to distant parts of the world, but only at speeds and in volumes dictated by natural forces (wind, water, animal, and human power). The two remaining barriers were the technology and organization required for bulk flow. The initial phase of globalization (driven by sail technology) was followed after 1800 by the development of the institutions, modes of thought, and control mechanisms needed to manage the technologies to be unleashed over the next two centuries (coal and steam, electricity, oil, nuclear energy).

From 1840 on, the technologies and institutions of globalization diverged, depending on whether they were moving physical objects or ideas and images. For moving objects, from 1840 to 1910, the dominant technology was the coal-fired steam engine and its application to rail and ship transport; after 1910, steam was joined (and eventually replaced) by

the internal combustion engine and petroleum, and railroads and ships by automobiles, trucks, and airplanes. For the movement of information and images, the principal technologies from 1840 to 1940 were the telegraph, telephone, film, recorded music, and radio; from 1940 to the present, these have been joined by computers, television, satellites, fiber optics, and many others.

SEVEN EPISODES OF GLOBALIZATION

This section is devoted to a very brief summary of the seven episodes of globalization, along with some mention of each episode's distinctive bulk flow systems (Clark 1997) (Table 10.2).

Episode One

Humankind's journey to become a global species began about 100 millennia ago, in east Africa. Equipped with only what they could carry in their bare hands, our distant ancestors walked out of Africa, across Eurasia, across the Bering Sea land bridge, and into the Americas. Although they unwittingly carried seeds and microorganisms on their skin and in their blood and their gut, for the most part, they had to begin their journey without the benefit of visible bulk flow systems.

Episode Two

By about ten millennia ago, *Homo sapiens* had increased their number to between four and six million, about the carrying capacity of the earth without the aid of technology. Having run out of fresh landscape, they began the great transformation we know today as the Neolithic revolution. Domesticated plants and animals were their first bulk flow systems, but they also devised a number of technologies for moving matter and energy. Pottery and basketry were developed to provide containers for storage and transport; canoes and small boats provided access to water routes for trade. Sledges drawn by humans or dogs were the only mode of transport across land, although human porters also were used. Beaten paths appeared as humankind's first roadways.

Episode Three

About five millennia ago, our ancestors had gathered together in settlements so large and densely populated that they could not be supplied

TABLE 10.2**Seven Episodes of Globalization and Related Bulk Flow Systems**

Episode	Title	Approximate Dates	Available Bulk Flow Systems (representative examples)
One	Out of Africa	100,000 to 10,000 years ago	Human beings
Two	The Neolithic revolution	10,000 to 5,000 years ago	Domesticated animals and plants; pottery, basketry; sledges, canoes
Three	Ancient cities and trade routes	3000 B.C. to 1400 A.D.	Draft animals, human porters; trade diasporas, camel caravans; maritime cities; wheeled vehicles; sail-driven ships; amphora jars, writing, paper, maps
Four	Age of discovery	1400 to 1800 A.D.	Chinese treasure fleet; Portuguese caravel; trading companies
Five	Partnership of steam and coal	Nineteenth century	Coal and steam engine, steamship, railroad, telegraph, telephone
Six	Petroleum and the internal combustion engine	Twentieth century	Gasoline engines; automobile, truck, airplane
Seven	The Information Age	1960-?	Digitalization of analog information, computers, satellites, lasers, fiber optics, television

Note: The titles of the seven episodes are taken from Robert Clark (1997).

solely from nearby sources, so history's first long-distance trade routes appeared: in the eastern Mediterranean, across the Indian Ocean, and eventually across Eurasia (the silk road). Mesoamericans developed their regional trade patterns somewhat later, about one to two millennia ago. Advances in the transport of matter and energy included containers such as the amphora, which was key to trade in the Bronze Age; the domestication of large animals such as horses and oxen to haul wheeled vehicles and harnesses to allow them to do so efficiently; the camel caravan; and maritime technologies such as the lateen sail and the sternpost rudder. During this episode, humankind began to develop bulk flow systems for information as well: paper, leather, papyrus, and clay for recording information; mathematics and accounting for compressing information into smaller spaces; and maps to assist travelers in their journey.

Episode Four

Many historians conventionally date the beginning of global history on October 12, 1492, when Europeans and Amerindians first established lasting contact. In a broader sense, the 400-year period from 1405, the launching of the voyages of the Chinese treasure fleet, to 1804, the first use of fossil fuel for transport, saw the transformation of Europe from a relatively unimportant world backwater to the driving engine of globalization. Many advances in bulk flow systems were registered during this period, chief of which were the Portuguese caravel (a combination of sail design, ship construction, navigation and guidance systems, and timekeeping devices); the science of cartography, based on the rediscovered maps of Ptolemy; and the first institutions created to gather, store, and transmit information about the world (the maritime headquarters of the Portuguese Prince Henry the Navigator was the prototype of this "institutionalized feedback").

Episode Five

Through the first four episodes, the global imperative had to be resolved within the constraints of natural forces (wind, moving water, muscle), which meant that bulk flow systems were limited to using the sun's energy relatively soon after it reached the earth (i.e., in "real time"). The steam engine opened a new era in globalization by making it possible for us to tap energy supplies that had lain stored beneath the earth's surfaces for tens of millions of years. Through the nineteenth century, the steamship and the railroad linked industrial cities to global supplies of

food and raw materials; carried tens of millions of immigrants across the Atlantic; allowed Europeans to expand their empires to Africa, India, and China; created internal markets across the vast spaces of North America and Russia; and facilitated the spread of bulk flow information systems across land (telegraph lines laid along railroad rights of way) and water (submarine cables laid by steamship).

Episode Six

The symbiotic development of petroleum and the internal combustion engine ushered in a new wave of globalization at the turn of the twentieth century. After Henry Ford's assembly line was introduced in 1912–13, the automobile became an object of mass ownership. Eventually, the automobile not only would provide personal mobility beyond our wildest dreams but also would reinforce globalization by fostering the growth of a global energy system (pipelines, tankers, and so on) and by becoming a global product in its own right. After the Wright brothers showed that powered, controlled flight was possible, gasoline-powered engines would make possible the conquering of the skies, the last obstacle to globalization.

Episode Seven

There still remained one last challenge: to create bulk flow systems for information. In the nineteenth century, the harnessing of electricity for the telegraph and telephone began the process. In the first two-thirds of the twentieth century, the discovery of ways to convert analog information to digital format (transistor, integrated circuit, microprocessor) made possible computers, television, satellite telecommunications, fiber optics, and all the other bulk flow devices we associate with the Information Age.

BULK FLOW, GLOBALIZATION, AND CITIES

The study of globalization is the study of global bulk flow technologies and social institutions, but we cannot understand global systems without studying the cities they were created to serve. These two institutions, cities and global systems, exist in a symbiotic relationship. Because their relationship is characterized by a positive feedback loop, they tend to reinforce each other's expansion.

This chapter has argued that societies in general, and cities in particular, cannot supply their own needs from local resources, so they require the support of systems to transport what they need from where it exists

naturally to where it is needed. To achieve this goal, cities require bulk flow technologies, because other modes cannot transport sufficient quantities of matter, energy, and information far enough and fast enough to be of use.

Just as cities need global bulk flow systems, however, global systems also need cities. The constant struggle to “persist counter to entropy” has forced us to devise dissipative structures to transport our entropy some distance from where it was created. We began to develop bulk flow technologies for doing this perhaps as long ago as 10,000 years. About 5,000 years ago, these systems reached a stage of complexity where they required a growing number of specialized operators who lived and worked in close proximity to each other. The more complex and extensive these systems became, the more specialized workers were required to support them. Hence, the vicious circle: human societies require the support of bulk flow systems; the larger these systems become, the more people are required to operate and support them, and, therefore, the larger the cities must become; the bigger that cities become, the more entropy they create and the more their support systems must expand to dissipate that entropy. Thus, the rate of urbanization rises along with the rate of population growth generally and the advance of globalization. In other words, the more of us there are, the more urban is our habitat and the more global the systems on which we rely for survival.

This positive feedback loop began to be apparent as soon as cities arose. Trade networks like the silk road made possible the flourishing and spread of ancient civilizations to something approximating a global culture of the times. Nevertheless, trade as a way of solving the resource constraints of cities was, in the very long run, self-defeating. Trade required bulk flow technology: storage and shipment containers like the amphora, warehouses to store them, ships to move them, harbor facilities to load and unload them, and navigation and steering devices to guide the sailors. Trade also required coordination and control: accounting devices to register and monitor orders, shipments, and payments; communications systems; and methods of maintaining schedules and timing. Trade also implied markets where buyers and sellers came together in some critical mass sufficiently large to justify the enormous costs of commerce. These tasks all required more and more workers dedicated to smoothing the flow of commerce, and this led to larger and larger population concentrations with implications for food, energy, disease, pollution, waste disposal, transportation, and housing. Trade, thus, required the steady expansion of cities, and, as cities grew, so did the systems on which they had come to depend for their survival.

Much the same can be said of the Age of Discovery, which would not have been possible without the port cities where there could be assembled a critical mass of sailing experience and information; trade networks and brokers; docks, wharves, and warehouses; financial capital; ship construction and repair; maritime expertise (especially navigation); and consumer demand. Columbus's home town, Genoa, was one such place; so were the key French ports of Dieppe and Rouen.

Two kinds of cities played a key role in the emergence of a global economy before 1800. The first included cities that were the center of economies by themselves, such as Venice, Genoa, Antwerp, and Amsterdam (Braudel 1984; Davis 1973). The second category included regional port cities that served the hinterland of large territorial states (nation-states, as they were coming to be called). The prototype of this type of city was Bristol, on England's west coast, from where John Cabot set sail to search for the fabled Northwest Passage to China in May 1497 (Morrison 1978: 43–49). Without the increase in city size, density, and specialization exemplified by ports like Bristol, the great wave of European expansion in the sixteenth and seventeenth centuries would not have been possible. Likewise, without overseas expansion toward something resembling a global economy, city growth would not have been possible.

These observations are especially pertinent for cities in the Information Age. Cities in highly industrialized countries are, and, by their nature, must be, connected to systems that are extremely complex and global in scope. They must become "global cities" (Sassen 1991), even if no local elites expressed a preference for establishing such linkages, no public policy decisions were directed at bringing them about, and there was no historical precedent for doing so. Cities become enmeshed in global systems not because of conscious policy decisions but because of the global imperative. At the same time, the global systems of information, production, trade, and waste disposal still require the communications and control structures that can be housed only in large cities, frequently in the "urban villages" on their periphery (Castells 1989; Leiberger & Lockwood 1986). Thus, despite the often-heard contention that globalization has done away with the need for cities as transaction centers, the reality is exactly the opposite. Globalization stimulates urbanization, or perhaps we should say "suburbanization."

About 8,000 to 10,000 years ago, humans began to gather in settlements with populations in the low hundreds. By the end of this millennium, we will have created a number of cities with populations in the tens of millions. Such cities are not natural habitats for us; we did not evolve to live in such densities. However, more to the point, cities of such size

cannot survive on the resources and sink close at hand. Urban life could not have been achieved without the invention of bulk flow technologies that connect cities to global systems. Imagine life in my city, metropolitan Washington, D.C., without the Chesapeake Bay as a sewer, West Virginia as a landfill, Venezuela as a source of gasoline, southern California to give us fresh vegetables in January, or El Salvador and South Korea to provide construction and service workers.

For millennia, we have labored to free ourselves from the bonds of entropy and the second law of thermodynamics. Despite our spectacular successes of technological and social inventions, we have failed to achieve our broader objective. After each wave of global expansion, we responded by increasing our number, the density of our population centers, the consumption level of the more fortunate of us (a number also increasing, in some places and in some historical periods faster than in others), and the scope and complexity of the bulk flow systems required to support all of the above. We have also, in the process, spread ourselves across the earth. By means of dissipative structures and bulk flow systems, we have persisted counter to entropy, but we have not conquered the second law, nor shall we ever do so.

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III

AIR TRANSPORT

Cities and the Spatial Articulation of the World Economy through Air Travel

David Smith and Michael Timberlake

Although the concept of “world cities” and serious efforts to empirically study global urban systems originated in the 1980s, the notion of urban hierarchy is an old one that has periodically arisen in U.S. social science over the course of the twentieth century. In the 1920s, theorists like N.S.B. Gras (1922) and Roderick McKenzie (1927) wrote at length about the emergence and effects of “metropolitan dominance”; in 1960, *Metropolis and Region* used its ambitious statistical analysis to demonstrate how “the structural geographic pattern of flows” between U.S. cities shaped the emerging national urban hierarchy (Duncan, Scott, Lieberman, Duncan, & Winsborough 1960: 133). This literature resonates with the theme that cities are crucial “crossroads”: places where networks of travel and communication intersect in ways that are fundamental to regions’ spatio-social structure. Following insights promulgated by Charles Cooley in his famous 1930 essay on “the theory of transportation,” generations of urban scholars have argued that important settlements occur, and population and wealth concentrate, at strategic locations where trade and travelers converge (Hawley 1971: 24).

Now, in the late twentieth century, there is little doubt that there is a complex but well-ordered world system of cities, and the “position” that an urban place occupies in this hierarchy has important ramifications for its people’s prosperity and way of life. A relatively new, but already rich, research tradition currently addresses how various locales articulate with

global structures and processes. Some of the most insightful efforts are in-depth comparative historical case studies of particular cities or regions that link local social and political-economic changes to the broader currents of the world economy. Our approach in this chapter is quite different, but complementary. It attempts to describe the basic morphology of the global city system at a particular point in time, providing a “snapshot” of its structure. By looking at ties that bind cities to one another and measuring the volume of various types of “flows” between them, we should be able to create theoretically useful images of the world urban hierarchy itself. Although some intercity flows (e.g., electronic mail and money transfers) are relatively free of the “friction of space,” most are not. Therefore, our task of identifying and describing intercity linkages — and the forms of hierarchy that they generate — returns to the role of transport. In this chapter, we focus on a description of the network characteristics of the world-system’s system of cities using data on the flows of airline passengers between the world’s leading metropolises.

AIR TRANSPORT AND THE WORLD CITY SYSTEM

Previously, we presented detailed arguments about the importance of understanding cities and urbanization from a global perspective, various methodological strategies for accomplishing that task, and synthetic reviews of the research on cities in the world-system (Timberlake 1985; Smith & Timberlake 1993, 1995a, 1995b; Smith 1996). In this chapter, we deliberately eschew a reprise of these discussions. Instead, our objective here is to demonstrate that we can meaningfully contribute to understanding the world-system’s global city hierarchy by closely examining air passenger transportation networks.

A Network Perspective

A first premise involves methodology. Although it undoubtedly is true that we can learn a great deal about global cities by studying their attributes, our strategy for understanding the structure of the global city system focuses on relationships between places. Macrostructural theories in social science are frequently about patterns and processes of social connections and oppositions (i.e., networks), but most research involves measuring the “amount of” or “degree to which” an individual person, place, or thing possesses some characteristic (for a general discussion, see Tilly 1984). It is no mystery why this is so: information is more frequently collected on the measurable characteristics of individual people and

organizations (including cities and nations) rather than on the actual relations among them, that is, data purporting to measure attributes are widely available, but data on networks of ties and flows are not. For instance, the issue of “data availability” compels scholars to look at variables like “foreign capital penetration” or count the number of “corporate headquarters,” when they are actually conceptually interested in relations of dependence or dominance. (We are referring here mainly to quantitatively based research. Comparative historical research and other qualitative methodologies usually better represent relations among various types of actors in various settings.) However, it is important not to allow necessity to be turned into a virtue: when conceptual discussions center on systems defined by patterns of linkages, the advantages of network analytical research are clear; the problem usually involves finding appropriate data.

The “world city hypothesis” is an exemplary case of this type of relational theorizing. The first sentence of the initial formulation of this argument is very explicit: “Our paper concerns the spatial articulation of the emerging world system of production and markets through a global *network* of cities (Friedmann & Wolff 1982: 309 [emphasis added]). Let there be any doubt about the importance of the relational aspect of this theoretical approach, John Friedmann’s (1986) attempt to further specify his ideas includes a sociometric “map” of “the hierarchy of world cities” complete with lines specifying “linkages.” The notion that truly dominant global cities are “command and control centers” of world production and market systems is consistent throughout the key contributions to this literature (see also Friedmann 1986; King 1990; Sassen 1991; Knox & Taylor 1995). Perhaps the most evocative image of this is Richard Hill’s (1986) metaphor of the transnational corporate “spider’s web” linking cities across national boundaries into a great hierarchic array, with the urban centers that house the transnational corporate headquarters in the dominant central positions. There is little doubt that a crucial component of this conceptual model of the global hierarchy of urban places is its emphasis on intercity relationships. Obviously, one way to empirically “map” that structure would be to examine connections, exchanges, and flows between major cities.¹

Why Use Air Passenger Transport?

Global city networks, of course, are woven together by a richly variegated set of linkages and ties. The world’s urban places are knit together by economic, political, cultural, and social flows of people, material, and information (see Smith & Timberlake [1995a] for a fuller discussion).

Though methodologically driven network research might claim that “any of these will do” or that “the more matrices the merrier,”² the world city literature is quite explicit about which types of flows are most important.

Friedmann (1986: 70) says that analysis should center on “relations that link the urban economy into the global system of markets for capital, labor, and commodities.” Saskia Sassen (1991: 3–4) directs our attention to global cities as “highly concentrated command posts in the organization of the world economy . . . key locations for finance and specialized service firms, which have replaced manufacturing as the leading economic sectors . . . sites of production including production of innovation in these leading industries . . . (and) as markets for the products and innovations produced.” Recently, prominent urbanologists have argued that “information” is the critical factor underlying the contemporary global city formation (Castells 1994; Sassen 1994). However, this interest in “telematics” is clearly linked to the role that technical innovation plays in the “information economy” (see Sassen 1994: 1–2 [emphasis added]).

There is little doubt: economic relations are the most critical ones in these writers’ minds. Thus, ideally, we would want to map fundamental sorts of economic exchanges, for example, the flows of capital or profits. However, because this type of data is usually virtually impossible to find, we might turn instead to information on flows of commodities and labor. There are extensive data on commodity and population flows (i.e., migration). However, again, there is a problem that prevents us from being able to use this information to describe the structure of relations among cities. There are good data on international flows of investment, products, and migrants, but little data for city networks.³ One major advantage of information on air travel and other forms of transportation is that they are collected for particular ports or nodes, which usually are in or near major cities.

David Keeling (1995: 116) presents a strong argument for both generic claims about “transport’s key role in the world city system” and specific ones that the air passenger links that we will examine are an excellent source of data:

Airline linkages offer the best illustration of transport’s role in the world city system for five reasons: (i) global airline flows are one of the few indices available of transactional flows of inter-urban connectivity; (ii) air networks and their associated infrastructure are the most visible manifestations of world city interactions; (iii) great demand still exists for face-to-face relationships, despite the global telecommunications revolution (Heldman 1992, Noam 1992); (iv) air transport is the preferred mode of inter-city movement for the transnational capitalist class,

migrants, tourists, and high-value, low-bulk goods; and (v) airline links are important components of a city's aspirations to world city status. (Keeling 1995: 118)

Keeling also points out that airports and air connections often become important political issues in various cities. For symbolic reasons as well as for economic self-interest, members of growth coalitions and of the capitalist class seek to gain public support to develop "their" city's airline capacity.

Research on City Systems and Air Travel

A few scholars have used air travel in empirical studies comparing cities. In her study of the degree to which European cities are "internationalized," Nadine Cattán (1995: 303) argues "because of its relatively rapid capacity to reply in terms of supply and demand, air traffic provides a pertinent indicator in the quest to evaluate the international character of western European cities." Although she apparently has network-type data, she condenses it to attributional data and shows that variation among European cities' international "attractivity" (in terms of air traffic) is explained by a variety of factors, including each city's relative standing in its national territorial system. David Simon (1995: 139) also uses air traffic as one measure of a city's standing in the world-system: "The progressive expansion of civil aviation reflects continued growth in business and international tourism." His analysis reveals "the relative insignificance of sub-Saharan African airports relative to those in the NICs," Cairo as Africa's busiest airport, Johannesburg as sub-Saharan Africa's "gateway," and Lagos as "surprisingly unimportant given (Nigeria's) vast population and considerable potential in view of its economic situation" (Simon 1995: 139).

Our earlier analysis of airline passenger flows among 23 of the 30 "world cities" identified by Friedmann (1986) indicated that London, New York, and Tokyo, in descending order, are the most "central" global cities, which confirms the qualitative assessments of key theorists of the world city thesis (Friedmann 1986; Sassen 1986, 1991, 1994). However, there was also a surprise near the top. Network analysis revealed Paris to be structurally similar to London — more central than New York or Tokyo on the global city system dimension. Friedmann's (1986) second group of world cities, those with "multinational articulations," includes Miami, Los Angeles, Frankfurt, Amsterdam, and Singapore. Our network analysis corroborated the assignments of Frankfurt, Singapore, Amsterdam, and

Los Angeles to this second group. However, Miami was revealed as rather dissimilar to these cities, grouped with many of the cities he classifies as having “subnational/regional articulations.” Hong Kong, on the other hand, appeared in our analysis to be more central than Friedmann gave it credit. We found it to be similar to his “multinational articulates” (i.e., Frankfurt, Singapore, Amsterdam, and, according to us, Los Angeles). Another interesting finding of our prior study was that Los Angeles and Chicago were revealed to be much less central than the top four cities — in fact, they were found in “the middle of the pack,” structurally similar to Mexico City.

Overall, our findings supported the general assessment made by Friedmann. However, the results might be much different had we included more of the world’s large cities, rather than limiting our network analysis to the cities Friedmann identified as “world cities.” Simon (1995) argues that we need to consider peripheral cities as important loci of transactions and exchange in the world-system. Certainly, there are methodological arguments, as well as substantive ones, for including a wider array of cities in the network analysis. These techniques are designed to capture the structure of an entire system of ties or links. If we accept Simon’s premise that peripheral cities are important nodes in this system, including them in the quantitative analysis should render a more complete and accurate picture of the hierarchy. Because these techniques are sensitive to the presence or absence of connections between all dyadic pairs, it is possible that including data on a more exhaustive list of cities could fundamentally change the overall results, including reordering those cities closest to the top.

THE GLOBAL NETWORK OF 110 CITIES

The Data

Network analysis requires data on interactions between all pairs of actors located in the network that have been identified (or hypothesized to exist). Once we became aware of the availability of international airline passenger flows among pairs of cities, our goal was to code these data for as many of the world’s important cities as possible. Our primary data source was *On-Flight Origin and Destination* for 1991 (1993). Based on reports from states on airline activity to and from each city within their boundaries to or from any city outside of their boundaries, the International Civil Aviation Organization (ICAO) publishes quarterly and annual figures on numbers of airline passengers traveling between cities in

different countries. There are two important limitations to these data. First, in order to preserve the confidentiality of “states and airlines,” the ICAO provides data on travel between international city-pairs only when “at least two airlines representing at least two different States have reported” (International Civil Aviation Organisation 1993: II).

This source gave us 1991 passenger flow data for 98 pairs of cities. Because the ICAO compiles data only for passengers traveling between different countries, these 98 cities represent 98 different countries. This is a second unwelcome limitation to the coverage of these data. We would prefer to have included all of the world’s major cities, including those within the same nations. Instead, we lose cities like Toronto, Rome, and São Paulo because we decided to include Montreal, Milan, and Rio de Janeiro. At the risk of seeming United States-centric, we partially compensated for this limitation by adding airline passenger flows between nine U.S. cities in addition to New York: Los Angeles, Chicago, Miami, San Francisco, Seattle, Boston, Washington, Houston, and Dallas. These data are available from the Air Transport Association, and we obtained them for 1991. In addition, we were able to add Osaka and Nagoya to the matrix, increasing the representation of Japanese cities in our data to three (with Tokyo).⁴ Finally, we estimated the volume of air passenger traffic between one pair of cities, London and Hong Kong, which the ICAO apparently does not consider to be an international pair — at least not until 1997. We did this by assigning passenger totals between this pair at levels comparable to other similar pairs and based on patterns of air traffic between each of London’s and Hong Kong’s other partners. Our resulting matrix of network data, thus, included 110 cities, with each city listed as both a destination and an origin. Admittedly, some of these cities are far from being “world cities” in Friedmann’s sense. Our goal was to maximize the geographic coverage of the data by including cities from as many different countries as we could. This strategy resulted in including several small cities with very low levels of air passenger traffic.

Not surprisingly, many of the cells in the resulting matrix contain zeros, indicating that no air passengers traveled directly between many of the pairs. On the other hand, among cities that *are* linked, some have very large numbers of passengers (e.g., 845,781 flew from Dublin to London and 840,530 flew from London to Dublin). Because the distribution of numbers in these cells is rather skewed, we logarithmically transformed them before running the network analysis. (Of course, we left the zeroes alone; only nonzero numbers were transformed.) We should note, too, that, although we have an in-flow–out-flow matrix, not much new information is added by including both. The numbers of passengers who

traveled one way between each pair is usually very close, in proportional terms, to the number who traveled in the other direction, as indicated by the London-Dublin numbers given above. In fact, many of them are undoubtedly the same individuals, having obtained round-trip tickets. Other types of flows among cities in which we are interested are likely to be less symmetrical. For example, commodity flows (measured in monetary value) would almost certainly be asymmetrical, because most products or components that are shipped by air presumably would be consumed (or perhaps incorporated into another transportable product) at their destinations. Analyzing these kinds of flows in addition to air passengers would allow a more nuanced description of the world's city system, and we look forward to moving in this direction in future work.

Findings

There are at least two computer software packages available that support quantitative network analysis. Here, we use STRUCTURE (Burt & Schott 1991), available from Columbia University's Center for the Social Sciences.⁵ The STRUCTURE software allows one to describe networks in a variety of ways. One of the most basic is its portrayal of clusters of interacting members within the network. These are subgroups of the larger network that are relatively tightly interlinked with one another — their relations are relatively strong and intense, or “cohesive.”⁶ Potentially more revealing are network analyses of cities' structural equivalence within the whole set of cities contained in the network. Equivalence analysis identifies cities with similar “profiles of relations” with other cities. Cities that are relatively dominant within the whole system should be revealed as structurally equivalent, as should cities that are linked only peripherally to the world city system. We provide findings for both “cliques” and “equivalence” as evident in the patterns of intercity linkages in the 110-city network we have identified.

Cliques

We decided to use the procedures that would identify the completely connected reciprocating cliques. Thus, cities share clique membership on the basis of having stronger *direct* ties with fellow clique members than with nonclique members. Clique membership identifies cities that are relatively cohesive in terms of the volume of air passenger travel among each of its members. Cliques are distinguished from one another not only when there is an absence of interaction but also when the nature (e.g.,

volume and extent) of the interaction is distinct. For example, New York shares heavy passenger exchanges with Washington, Zurich, and San Francisco, but these four cities are located in different cliques because the intensity of passenger exchanges for each of these is more similar with their respective clique partners.

STRUCTURE's cohesion analysis produced 26 cliques, ranging in size from 2 to 9 cities, each within our network of 110 cities. Eighty-two of our cities are in one of these cliques. We emphasize that the cliques are identified on the basis of relatively strong direct linkages; a city's clique does not describe all of that city's partners in the exchange of air passengers, only those that are more strongly tied to it than to others of their partners. For example, the U.S.-European clique in which New York City is situated has 9 members, but in our data, New York interacts with 46 other cities. Most of these nonclique partners of New York are located in other cliques. For example, Bombay, a partner of New York City, is in the clique with Colombo, Dubai, and Karachi because its ties with these cities are stronger than with New York, presumably relatively comparable in strength to New York's ties with its fellow clique members. Like New York, in this respect, Singapore interacts with London, Los Angeles, and Tokyo, for example, none of which appear with it in the Southeast Asian clique. Tokyo is in a clique only with Seoul, but its partners in air passenger exchange are numerous, and the volume of passenger travel in and out of Tokyo is quite high. However, the ties between Seoul and Tokyo set this pair apart from other potential cliques. Of course, this is a function of the assumptions that guide this particular feature of the STRUCTURE network analysis program.

The cliques are shown in Table 11.1, which is organized in a rough geographic order moving north from a South African clique pair to the Middle East, then eastward to Asia, on to the Americas, and then to Europe. As we would expect, the groups of cities identified as cohesive with one another are usually geographically proximate. Eleven of the groups consist of pairs of cities that are relatively nearby. For example, there is the South Africa-Indian Ocean pair of Johannesburg and Mauritius, the Congo and the Franco-West Africa pairs (Kinshasa and Libreville and Conakry and Dakar, respectively), a Trans-Pacific pair consisting of Manila and San Francisco, and Bucharest and Istanbul comprising a far-southeastern Europe clique. There are three three-member cliques in Africa, including the Central African Cone, Gulf of Guinea, and West Africa. Note from the table that the number of contact cities for these African cities is relatively low, as is the volume of passenger travel (except for Johannesburg). Moving northward, we find two clusters of

well-connected cities that we have labeled "Pan-Arabia" (Damascus, Kuwait, Cairo, Riyadh) and "Indo-Arabia" (Colombo, Bombay, Dubai, and Karachi). Here, the number of contacts and flows of passengers are still on the low side but significantly greater than in the African clusters (with arrivals in Cairo, Bombay, and Dubai approaching 1 million).

There are four cliques on the Asian side of the Pacific rim, and among these, the numbers of contacts and passenger flows are quite high, indicating much more activity than is evident in Africa and the Middle East. In the Southeast Asia cluster, there are four cities, Jakarta, Kuala Lumpur, Bangkok, and Singapore, with arrivals in the latter two exceeding 3 million and 5 million, respectively. In addition, Auckland and Sydney are paired in a moderately active Tasman Sea clique. More active are the Japan-China Sea triad of Osaka, Hong Kong, and Taipei and the pair composed of Tokyo and Seoul. Traffic among these cities, except for Auckland, is in excess of 1 million annual arrivals, exceeding 6 million in both Hong Kong and Tokyo, with Singapore not far behind at about 5.5 million. Again, it is interesting to note that, in spite of the heavy traffic into Tokyo, it "clusters" with only one other city. In this case, the strong ties between Tokyo and Seoul, coupled with Seoul's relatively weak ties with other potential cliques, pulls the two into the same cluster in this analysis. Though Tokyo is strongly tied to Bangkok and Singapore, its ties with the other two members of the Southeast Asia clique are not as strong, whereas both Bangkok and Singapore are very strongly tied to these common clique members (Jakarta and Kuala Lumpur). This pattern points to the need to interpret some of these findings in combination with other sources of information. Clearly, Tokyo is a key city in the region, and the fact that it is not as well-connected with some other important cities in the region does not mean that it lacks influence.

The cohesion analysis leads us across the Pacific to the United States with the identification of a Manila-San Francisco clique. Three of the U.S. cities (Boston, Washington, and Seattle) do not seem to have strong international ties, because they cluster together to the exclusion of any non-U.S. cities. It is ironic that one of these cities is arguably the world's geopolitical capital, Washington, D.C., indicating, once again, that we must take care in interpreting the significance of these patterns. Chicago provides a link with Canada, though we may have found different patterns had we been able to include Toronto and Vancouver as well as Montreal.

Exceptions to geographic clustering occur when a city that serves as an important link between world regions appears with the "foreign" cities to which it links. Examples, in addition to the Trans-Pacific pair (San Francisco-Manila), are the Calmextex clique of Dallas, Houston,

TABLE 11.1
City Cliques Based on 1991 International Air Passenger Travel

Clique Composition	Number of City-Contacts	Passenger Arrivals from Other Net Cities
South Africa–Indian Ocean		
Johannesburg	20	609,825
Mauritius	9	240,413
South-Central Africa		
Gaborone	4	32,824
Lilongwe	7	39,194
Lusaka	6	69,173
Gulf of Guinea		
Abidjan	12	162,269
Lagos	11	195,193
Lomé	9	20,376
Congo Basin		
Kinshasa	8	29,126
Libreville	4	5,754
French West Africa		
Conakry	5	26,376
Dakar	7	68,969
East Africa		
Dar es Salaam	11	49,274
Entebbe	3	25,175
Nairobi	21	373,565
Pan-Arabia		
Damascus	13	185,129
Kuwait	14	499,509
Cairo	24	880,705
Riyadh	12	704,604
Indo-Arabia		
Colombo	11	268,962
Bombay	19	979,383
Dubai	26	965,601
Karachi	22	624,586
Southeast Asia		
Jakarta	15	1,114,157
Bangkok	32	3,406,049
Kuala Lumpur	18	1,839,947
Singapore	28	5,492,963
Tasman Sea		
Auckland	13	690,279

Table 11.1, continued

Clique Composition	Number of City-Contacts	Passenger Arrivals from Other Net Cities
Sydney	16	1,253,288
Japan–China Sea		
Osaka	9	1,180,694
Hong Kong	24	6,413,017
Taipei	13	2,730,291
Tokyo–Seoul		
Seoul	8	1,308,046
Tokyo	32	6,829,114
Trans-Pacific		
Manila	17	1,618,627
San Francisco	19	1,576,430
East-Northwest United States		
Seattle	12	391,634
Boston	15	915,084
Washington	17	1,010,563
Canamerican		
Chicago	21	1,633,673
Montreal	11	787,033
Calmextex		
Dallas	12	652,227
Houston	18	767,609
Los Angeles	35	3,080,005
Central South America		
Asunción	6	54,708
La Paz	6	62,912
Central America		
Panama	16	111,133
Guatemala City	9	237,361
San Salvador	10	168,684
Tegucigalpa	7	93,467
South American Cone		
Montevideo	4	198,051
Rio de Janeiro	22	905,223
Buenos Aires	21	1,043,951
Santiago	16	399,923
Pan-American		
Lima	15	309,717
Bogotá	14	312,876
Caracas	18	562,644

Clique Composition	Number of City-Contacts	Passenger Arrivals from Other Net Cities
Miami	33	2,697,555
Quito	11	130,013
West Europe–New York		
Lisbon	17	1,030,720
Madrid	32	2,182,632
Brussels	28	1,650,423
Milan	23	1,783,021
Amsterdam	42	3,404,634
Frankfurt	69	5,635,140
New York	46	5,892,326
London	63	12,874,161
Paris	70	7,034,161
Scandinavia Baltic		
Helsinki	16	966,519
Copenhagen	22	1,869,825
Greek Mediterranean		
Athens	23	1,166,566
Larnaca	10	410,399
Central Europe		
Budapest	15	474,823
Prague	15	391,468
East-Central Europe		
Moscow	11	237,493
Warsaw	16	571,525
Vienna	27	1,291,310
Zurich	40	2,508,085
Eastern Europe Fringe		
Bucharest	11	144,852
Istanbul	8	108,957

Los Angeles, and Mexico City, the Pan-American clique (Lima, Bogotá, Caracas, Miami, and Quito), and the West Europe–New York clique (Lisbon, Madrid, Brussels, Milan, Amsterdam, Frankfurt, New York, London, and Paris).

These findings bear out what many knowledgeable world travelers would probably guess are the major cliques of international cities, defined by air travel patterns. For our purposes they are useful in describing the manifest aspects of the airline linkages among international cities. Travel

by air links particular cities, uniting them into identifiable clusters, which are, in turn, linked to one another. The clique analysis shows that cities are linked most closely by geographic region. Exceptions are cities that serve as gateways for travelers between regions. Thus, some cities, rather than being grouped with others in their more proximate region, are clustered with more distant cities because it is with these that they have the strongest ties. New York's location is an example of this. New York City is relatively more strongly linked to major western European cities than it is to the other U.S. cities in our data set, not to mention to cities in Latin America and Asia.

Other cities serve to link nearby peripheral or semiperipheral regions to the core. For example, Ramon Grosfoguel's analysis shows that Miami increasingly has become a financial and industrial control center for the Caribbean basin. Improvements in the city's communication infrastructure made by the Central Intelligence Agency for geopolitical reasons in the 1960s later proved useful for transnational banks using Miami as home for "regional departments and headquarters" for operations in Latin America and the Caribbean (Grosfoguel 1995: 167). In our data, Miami is revealed as a gateway for air travelers from capitals of the more populous countries in northern South America. Because air travel tends to be symmetrical, we can say with equal authority that this clustering of cities indicates that Miami is also a gateway city for travelers from the United States to those same South American capitals.

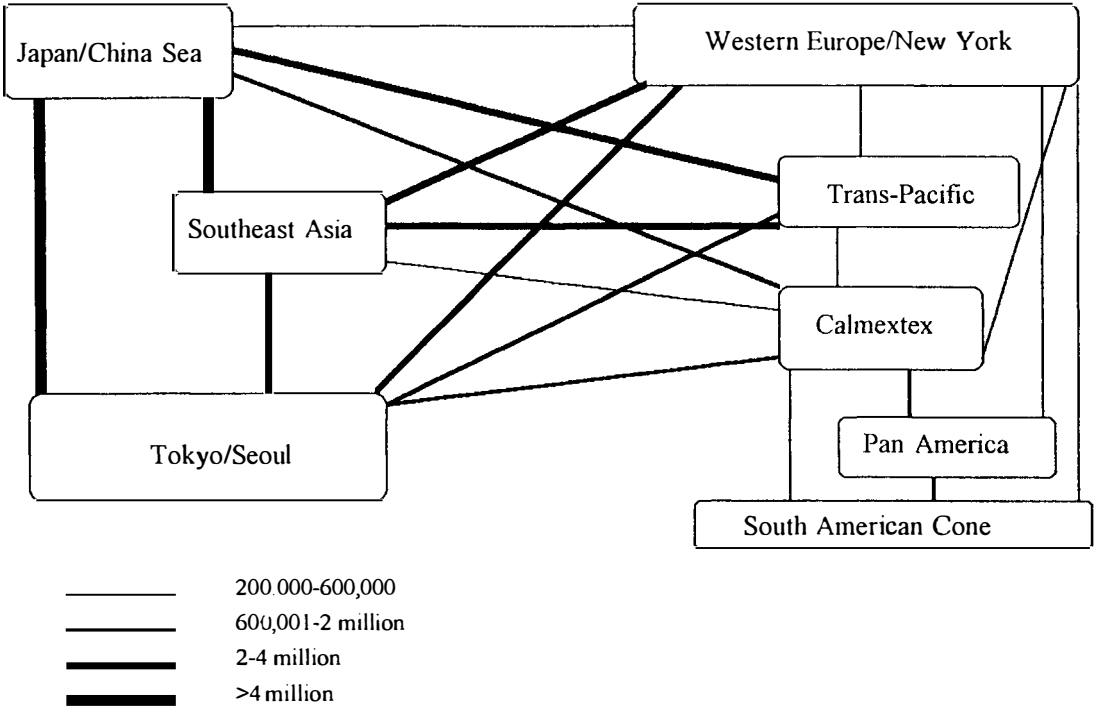
The flows among cliques is also of descriptive interest, though mapping the relations among all 26 of our groups is beyond the scope of this paper. For illustrative purposes, Figure 11.1 shows the interclique flows of 1991 airline passengers among selected cliques in Asia, the Americas, and western Europe.⁷ Here, variation in the volume of airline passenger flows between cliques is graphically represented, and we also can see variation in the number of significant interclique ties among the eight cliques represented here. The West Europe–New York group is linked to *each* of the seven other cliques, with flows to and from three of them at levels between 2 and 4 million passengers annually. The Calmextex clique also is linked to each of the other seven, though the volume of traffic is smaller. The volume of passengers traveling among the three Asian cliques is strikingly high. The Japan–China Sea clique, which includes Hong Kong, has flows in excess of 4 million between both Southeast Asia and Tokyo–Seoul.⁸ Each of these is linked to five of the seven available cliques in the figure, and in each case the non-Asian links are the same: West Europe–New York, Trans-Pacific (San Francisco and Manila), and Calmextex (which includes Los Angeles). The Trans-Pacific clique also

has five significant ties in the group. Only the Pan-American and the South American Cone have fewer than five interclique ties; they each have only three, none of them Asian. This interclique map demonstrates the centrality of the West Europe–New York clique, which, after all, has more cities than other cliques, all of which are in the core. Tokyo–Seoul, Southeast Asia, and Calmextex are also quite prominent in terms of numbers of links and volume of flows, with Japan–China Sea not far off. The very high volume of flows in the Asian cliques corresponds to the economic vitality of this region (as well as its large population size). The Pan-American and South American Cone cliques are revealed as less central than the other cliques in this map, with only three ties each and lower volumes of flows. This map shows that variation in the volume of air traffic and the scope of linkages among various regional cliques corresponds quite closely with other knowledge we have about the structure of the world-system.

Twenty-eight cities are not identified as having clique membership. Presumably, these cities are either relatively isolated from the entire world city system, with only weak ties to other cities in this network, or they are tied only to cities that are even more strongly tied to other different cities. Examining the volume of arrivals to these cities indicates that this group is composed largely of cities that have weak ties to the international system of cities — at least weak airline ties. Some are isolated primarily for political reasons (e.g., Havana, Ho Chi Minh City); others are economically isolated (e.g., Port-au-Prince, Ouagadougou). A few in this group are apparently fairly well-connected but lack clique membership for other reasons (e.g., Nagoya, Oslo, Dublin). Dublin, for example, has contacts with seven other cities in the complete network, and its volume of passenger arrivals is more than 1 million. However, almost 80 percent of these arrivals are from London, with flows among the other six contacts being relatively low.

It will be interesting to track changes in the pattern of clique membership in the world's cities over time. For example, in data collected after 1991, we would expect to find Beijing becoming more integrated with other international cities, possibly being identified as a member of one of the regional cliques described here, as China becomes more economically integrated into the world-system. Other Chinese cities also should become more integrated into the world city network. Data subsequent to 1992 also should show dramatic increases in the involvement of Johannesburg in the larger system.

FIGURE 11.1
Passenger Flows among Selected Cliques, 1991



Equivalence

Analysis of structural or relational equivalence in networks (often measured using some form of “blockmodeling”) is the most familiar methodological strategy used in previous network research on the global system (Snyder & Kick 1979; Nemeth & Smith 1985; Smith & White 1992). This technique provides us with a formal measure of the role that each point plays in the exchange system by gauging their similarities in terms of their patterns of ties or flows to all the other points in the network. To be exactly “equivalent,” two points would need to have precisely the same pattern of flows to all the other points. Stated a bit more abstractly, “Grounded in the image of status-role/sets within a social structure, equivalence between two actors increases with the extent to which they have identical patterns of relations within the social structure. Actors with identical profiles of relations are equivalent and make up a social category, a group termed a position jointly occupied by equivalent actors” (Burt & Schott 1991: 124). In large networks with quantitative data on the volume of flows (like the information we have on air links between world cities), it would be unusual to find many “equivalent” pairs. Instead, we are most interested in “locating” cities in terms of their degree of similarity in terms of their patterns of air passenger flows. The STRUCTURE program allows us to produce a multidimensional scaling (MDS) plot that reports the similarity-dissimilarity in terms of distance in two-dimensional space. The resulting plot “is an eigenvector representation of the equivalence data” (Burt & Schott 1991: 134).

Here, we follow a strategy that we used in our previous research (Smith & Timberlake 1995b). In that paper, we used the REGE algorithm, which provided a slightly different measure of “relational equivalence.” We claimed that the use of this technique allowed us to assess empirically the central claims of the world city hypothesis: Theoretical notions about the link between a city’s functions and its role in the global urban system suggest that cities should group into rough “levels” corresponding to their positions in the world city hierarchy (Smith & Timberlake 1995b: 295). Our previous results, examining just 23 major global cities, yielded an array that was strikingly close to the qualitative assessments of Friedmann (1986, 1995) and others (with London, Paris, New York, and Tokyo showing up as the more “central” places). We report on new findings using the greatly expanded network of 110 urban areas and a different equivalence algorithm. These new results are more complex than the old ones — which is hardly surprising given an almost five-fold increase in the number of cities included. However, the findings also are broadly

consistent with both our previous work and the world city hypothesis. At the same time, there are some striking patterns in these results that may suggest some interesting “wrinkles” in our theoretical understanding of the global city hierarchy.

Figures 11.2, 11.3, and 11.4 show the results of the equivalence analysis.⁹ There is a great deal of information on this graph, but two features stand out. First, cities become increasingly “similar” toward the bottom right-hand corner of the MDS plot, that is, cities begin to cluster closer together in the same equivalence space to the extent that they are in the lower right. This probably reflects the fact that these cities have relatively few direct air links — thus, they have similar flow patterns in that *no* passengers travel from them to most other cities. At the other end of the figure, cities in the upper left and middle of the graph are farther apart, indicating less structural similarity. Second, these relatively dispersed (and, therefore, dissimilar) cities tend to be located in nations in the world-system’s core and semiperiphery. Despite some degree of “spread” here, there are still identifiable groups of similar cities, and they are arrayed in a clearly discernible hierarchy.

If we just look at Figure 11.2, London, Paris, and Frankfurt seem to fit into a group, and if we broaden this structurally dominant cluster, we can easily include New York and Tokyo. At least in terms of air travel patterns, these five busy nodes are the key “global cities.” Even though they are somewhat dispersed, they are at the high end of both scale coordinates. Amsterdam and Zurich are structurally similar to each other and occupy a position that is very high on one dimension — arguably, they could be included in the top group. A little lower and somewhat to the right, there is an interesting group of four roughly equivalent cities consisting of Bangkok, Singapore, Los Angeles, and Hong Kong. These are influential Pacific rim nodes, articulating Asia with the rest of the world. Miami appears as a bit of an outlier, with a rather unique set of equivalence scores. On the other hand, Brussels, Copenhagen, Vienna, and Milan are tightly bunched, with Madrid not too distant from this cluster. Chicago is somewhat distinct from other cities, nearest to an identifiable group that includes San Francisco, Manila, Dubai, Cairo, Rio de Janeiro, and Kuala Lumpur, with Taipei and Mexico City occupying remarkably similar positions just below this group. All of these last cities seem to be “lower-level” cities that fall into the broad middle band of places that are labeled on Figures 11.3 and 11.4. Rather than comment in any more detail on individual cities in Figure 11.3, note that the smaller second-order North American and western European cities seem to cluster in the upper and left-hand portions of this middle band. The “bottom” 40 cities at the far

FIGURE 11.2
110 Cities

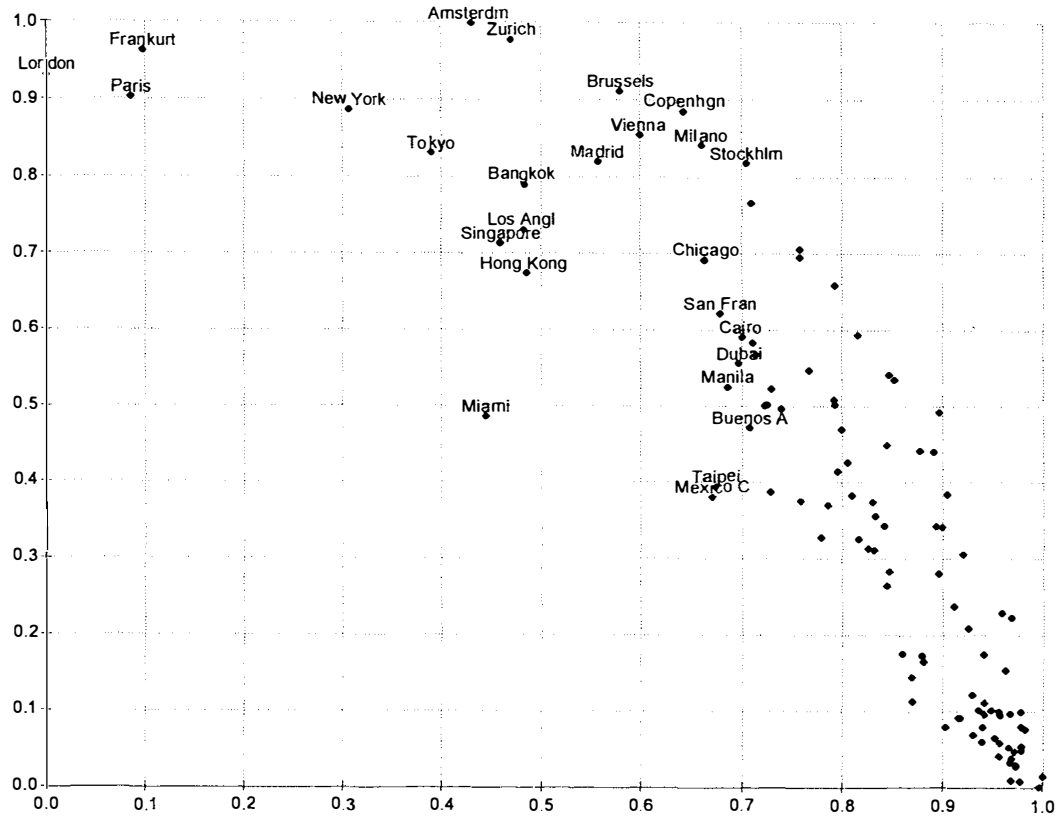


FIGURE 11.3
Right 90 Cities

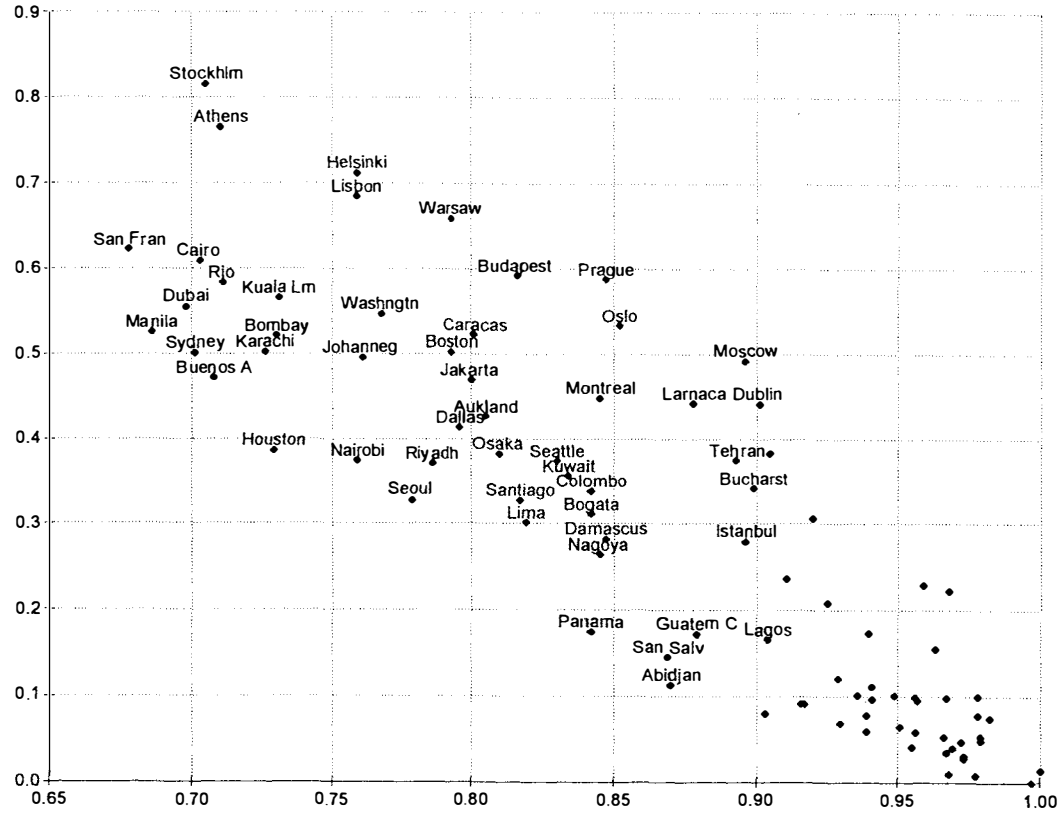
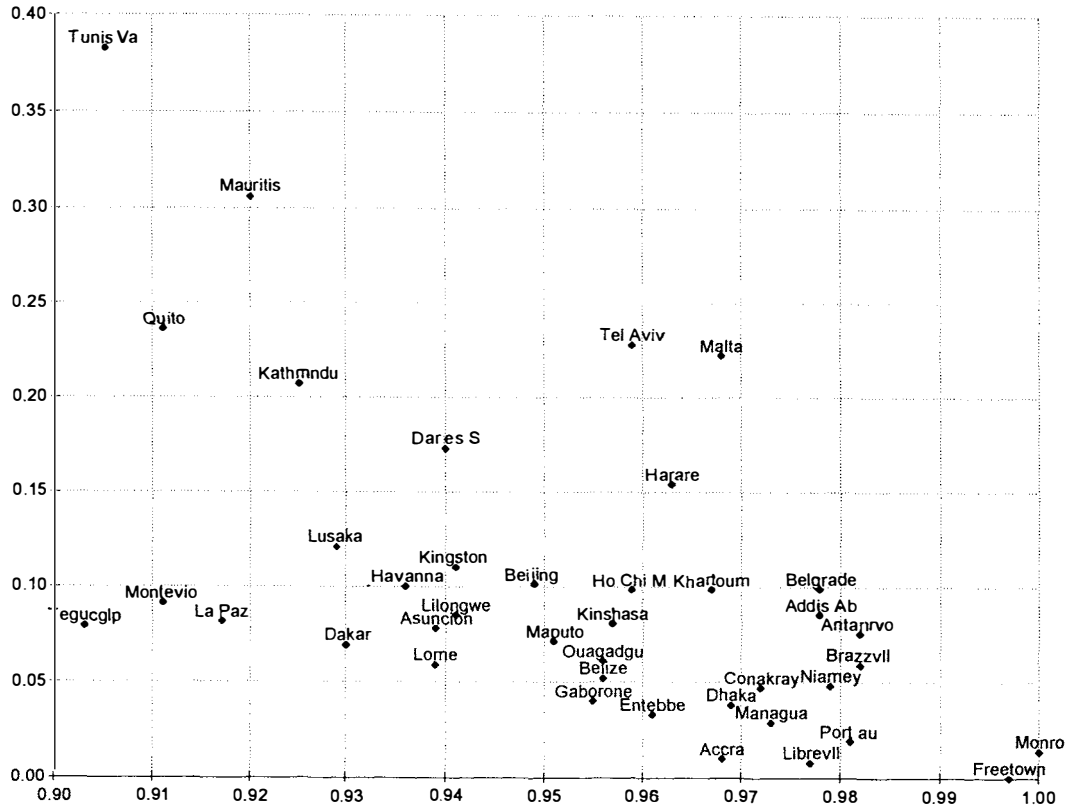


FIGURE 11.4
“Bottom” 40 Cities



right of the graph (labeled in Figure 11.3) are urban areas in peripheral Latin America, Africa, and Asia (with Beijing, Tel Aviv, and Belgrade showing up as “exceptions”).¹⁰

One of the difficulties with this sort of MDS result is interpreting the dimensions of the table. The STRUCTURE results show that the horizontal dimension is the stronger (eigenvalue = 62.09), but the vertical dimension (eigenvalue = 6.12) also adds important information. The first dimension seems to reflect a city’s degree of centrality in the world air travel system, which we would argue is at least a rough proxy for sheer “global cityness.” The other dimension is a bit fuzzier. It *seems* like there is “regional” dynamic at work, and this appears to be related to world-system status (with cities in the U.S., Japanese, and western European “core” scoring high, those at the edges of Europe and rising East Asia next, and those in the most peripheral areas — like Africa and Central America — at the low end).

Interestingly, these two dimensions are quite reminiscent of the classificatory logic that Friedmann (1986) used in his “world city hypothesis” article. If we look at Table A.1 in Friedmann (1986: 14), we find a two by two classification that groups cities by their degree of “world cityness” (labeled “primary” versus “secondary”) and their “core” versus “semiperipheral” location. He labels London, Paris, Rotterdam, Frankfurt, Zurich, New York, Tokyo, Chicago, and Los Angeles as “primary/core.” Substituting Amsterdam for Rotterdam and leaving out the last two U.S. cities, we get the cities in the upper left of our Figure 11.2. Friedmann (1986) also clusters Brussels, Milan, Vienna, and Madrid (all quite “close” in our results) into a group of “secondary core” cities. However, here, he also includes cities like Miami, Houston, and San Francisco, which are much more dispersed in our results.

The Miami case is particularly interesting: it is an outlier on the MDS plot, scoring very low on the second dimension. The previously reported cohesion analysis, as well as detailed case studies of this city (cf. Portes & Stepick 1993), suggest that Miami is a major air gateway to cities in parts of Latin America. Two of the other U.S. cities that score the lowest on the second dimension, Houston and Dallas, also have strong Latin American links. This suggests that this dimension may be more sensitive to the world-system status of the hinterland to which cities are connected than it is with their actual location within a core country. Therefore, cities that are major “regional articulators” but are connected to more “peripheral” regions will be differentiated along this dimension. This interpretation also is consistent with the relatively high clustering of Bangkok, Singapore, Los Angeles, and Hong Kong on this dimension.¹¹ These are

the key nodes on the Pacific rim and articulate East Asia with the rest of the world. Singapore has deep ties within the region (as indicated by its clique membership with Jakarta, Kuala Lumpur, and Bangkok) as well as strong connections to Tokyo. Hong Kong is tightly linked to Tokyo but also has significant ties to the European and North American core; Bangkok is a regional center that also has extensive European ties. Los Angeles serves a similar "regional articulator" function from the other side of the Pacific, linking Tokyo and the rest of Asia with the United States in addition to its connections to Mexico and Latin America.

To get an overview of these results, it is instructive to compare them with the findings of our earlier study (Smith & Timberlake 1995a). Despite the dramatically increased number of cities in this analysis and the use of a different equivalence algorithm, the results are consistent. London remains in the top spot, and the seven cities clustering nearest the top in this new analysis were all in the top eight of the prior results (Singapore slips a little lower in this study, but not much). The inclusion of more cities seems to have had the most significant effect on the ranking of Frankfurt: it moves from an eighth-place ranking (between Los Angeles and Singapore) to join the top three (with London and Paris). We suspect that the German city's extensive air connections with smaller Third World urban areas influenced this result. If we look only at the first dimension tapping global city centrality, Miami also moves up quite a bit (probably reflecting its Latin American and Caribbean ties).

CONCLUSION

Cities are key points of exchange in the world economy as well as loci of production and consumption. Exchanges between cities are guided by the logic of global capitalism and the geopolitics of the modern world-system. These exchanges knit cities together, reproducing a spatially articulated world-system. Though some intercity links (e.g., faxes) are relatively free of the friction of space, the role of transport obviously is still crucially important in linking cities. In this chapter we have examined one form of transport: commercial airlines, using data on the volume of 1991 airline passenger travel between all pairs in a set of 110 cities to produce a description of patterns of intercity linkages over the face of the globe.

In addition to our descriptive results in which numerous cliques of interacting cities were identified and interactions among the cliques themselves were described, our equivalence analysis produced findings that are consistent with theorizing about "world cities" (i.e., Friedmann 1995),

“global cities” (e.g., Sassen 1991), and our earlier findings. London, New York, and Tokyo are structurally dominant in our analysis, but they are joined by Paris and Frankfurt. “Gateway” cities, like Miami, Singapore, Hong Kong, and Los Angeles, that link distinct geographic and economic zones are also prominently displayed in both the clique and equivalence analyses.

The results are interesting, and in a “normal science” sort of way, they both corroborate and modestly extend the world city hypothesis. We have taken David Simon’s (1995) suggestion that cities of the periphery as well as the core and semiperiphery need to be incorporated into research and theorizing about global spatial articulation through cities. Perhaps the most interesting contribution the chapter makes is in demonstrating the promise and potential of using network analysis to model these patterns of spatial articulation. There are three different directions in which we hope to take this work in the future. One is to base our network analysis on additional types of intercity exchanges. For example, we soon will analyze the world city network defined in terms of air freight exchanges among these or a similar group of cities. A second is to examine changes in the structure of relations among cities in the world over time by examining these same data for different time points. Such analyses might prove useful in analyzing changes in particular cities’ (or regions’) involvement in the world economy.

Finally, cities are important arenas of social action. Though we have not at all focused on this aspect of cities, it is our assumption that our work ultimately may have some bearing here. Presently, we are concerned with describing the structure of relations among cities that link them into a global system of places. We assume that how they are linked has ramifications for social life within them, including implications for progressive change, and we hope to work on this in the future. Doing so will require going beyond description to examine why cities are located where they are in these networks, why they change, and what differences this makes for the cities and the people who live in them.

NOTES

1. Clearly, a similar argument can be made for using network analysis to operationalize the relational emphasis of Wallerstein-inspired world-system analysis, with its images of “unequal exchange,” dependency relations, and core-semiperiphery hierarchy. In this case, the unit of analysis, rather than cities, is usually nations or regions. For further discussion and empirical examples, see

David Snyder and Edward Kick (1979), Roger Nemeth and David Smith (1985); Smith and Douglas White (1992).

2. For a particularly egregious example of an atheoretical approach to modeling the world-system in this way, see Ronan Van Rossem (1996).

3. The flow of information may be an exception — data on phone, fax, or electronic mail links between numerous city pairs might offer an alternative network operationalization of the world city hierarchy to the one we offer here.

4. The Japanese intercity air passenger flows were obtained informally by asking a contact in Tokyo to locate the data, which he did by placing telephone calls to reliable sources.

5. UCINET is another network analysis software package. It is available from the Department of Sociology at the University of California, Irvine.

6. “Grounded in the image of socializing relations within a primary group, the cohesion between two actors increases with the extent to which they have strong, intense relations with one another. Cohesion is a symmetric condition aggregated across two actors’ relations with one another within one more input networks. Corresponding to the concept of a primary group, a clique is then a set of actors within which cohesion is high” (Burt & Schott 1991: 109).

7. We include the five busiest cliques (West Europe–New York, Southeast Asia, Japan–China Sea, Tokyo–Seoul, and Calmextex), to which we add the Trans-Pacific clique to round out the Asian-American connection and two Latin American cliques to illustrate possible semiperipheral or peripheral linkages among cliques.

8. Though beyond the scope of the present descriptive analysis, it will be interesting in future work to relate these air network patterns to regional research on growth zones. For example, Xiangming Chen’s work on free economic zones finds several “growth triangles” in Asia. “In Southeast Asia, a cross-national zone emerged in the late 1980s from the close economic ties among Singapore, Malaysia’s Johor State, and Indonesia’s Riau Islands” (1995: 607). Our Southeast Asia clique includes Singapore, Jakarta, Kuala Lumpur, and Bangkok.

9. These three figures portray, in telescoping fashion, the same plot. Figure 11.2 includes the entire 110-city network, with the subsequent figures focusing increasingly more closely toward the bottom right-hand corner of the plot, where cities are more numerous and more tightly clustered. The three are included so that more cities can be effectively identified by name.

10. It is possible that the roles of these cities are underestimated by our data protocol. When only one airline or one “state” carrier provides the air passenger link between cities, those data are not included in the ICAO compilation.

11. Some other cities, including Taipei, Osaka, Seoul, and Beijing, seem to score “too low” on this dimension. In part, this may be related to the continued peripheral status of a major part of their “hinterland”: the People’s Republic of China. However, probably more significant is the relatively small number of direct air passenger contacts from each of these places. Table 11.1 shows that Taipei is connected to just 13 other cities, while Osaka and Seoul have links to

fewer than 10; Beijing is an isolate in the cohesion analysis, with only 2 air passenger links to other cities in the network.

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Afterword:
Space, Transport, and the
Future of the
Capitalist World Economy
Paul S. Ciccantell and Stephen G. Bunker

Philip Steinberg's and Balder Raj Nayar's chapters highlighted the role of transport space and particularly the ocean as an arena of conflict between core and peripheral states and capitals, all seeking to reshape this transport space and the shipping industries that utilize this space. R. Scott Frey's chapter focused on an emerging relationship across this ocean space, the transfer of hazardous wastes from the core to the periphery. John Gulick's chapter examined the role of containerization and particularly container ports as the nodes that link ocean and terrestrial transport systems, allowing a dramatic increase in the pace of capital accumulation and the spread of production to remote peripheries because of the reduced transport times and costs resulting from container shipping.

The chapters focusing on land transport systems shifted the focus to the construction of core-periphery links via inland transport systems. Wilma Dunaway's chapter focused on an early intermodal system linking the Appalachian raw materials periphery to core industrial centers in Britain and to emerging core regions in the northern United States. Jonathan Leitner's chapter focused on the role of rail and Great Lakes transport in the development trajectory of the Upper Peninsula of Michigan; both of these studies highlighted the role of locally, regionally, and nationally based class struggles over the transport infrastructure and, thereby, over the benefits from raw materials extraction for shipment to core regions. Richard Lee's chapter examined a land transport link

between raw materials peripheries and the core: the construction of railroads in western Africa by European core powers. Saule Omarova's chapter on the oil industry in post-Soviet Kazakhstan and Azerbaijan provided a contemporary example of a land transport system for one raw material, petroleum, and the political and economic importance of this system for the states of the raw materials periphery and of core and semiperipheral regions. Robert Clark's chapter sought to synthesize a transhistorical theoretical understanding of the role of raw materials and information flows in human history utilizing the thermodynamic concepts of entropy and dissipative structures. Cities are the nodes and centers of these flows of matter, energy, and information. David Smith and Michael Timberlake analyzed hierarchical relationships in the world economy represented in flows of airline passengers.

Given the results of these studies of the role of space and transport in the history of the capitalist world economy and of contemporary changes underway, what implications for the future can be identified? First and foremost, there are a number of implications of the increased pace of capital accumulation and transportation and communications innovations on the one hand and the increased spatial integration and differentiation on the other. One implication is that, more and more, remote areas are now targets for minerals exploration and extraction because transport costs have been reduced and more easily accessible deposits are being depleted, as illustrated in Omarova's discussion of the oil rush into Kazakhstan and Azerbaijan despite tremendous political difficulties and economic uncertainties.

For other peripheral regions in locations remote from core markets but with large supplies of low-cost labor, these innovations have meant that these regions are increasingly integrated into global commodity chains as sites of labor-intensive production, including processing of information flows such as credit card receipts. Communications infrastructure, air travel, and air freight shipment of high-value products are economic and material processes underlying globalization.

For both types of peripheral regions, future opportunities and constraints will be shaped by core-driven processes, just as was the case in the past. Technological, organizational, and institutional innovations are the products of the strategic efforts of core states and firms to reshape and restructure the capitalist world economy to serve their own interests. Technological innovations in bulk shipping in Japan made raw materials production in areas not naturally amenable to social manipulations of nature in the form of the construction of large-scale ports much less competitive or even completely uneconomic, choking off development efforts

based on these raw materials because of relatively high transport costs in comparison with more naturally favored and politically and economically cooperative raw materials peripheries. Raw materials peripheries' states and firms are assuming a larger and larger share of the costs and risks of constructing raw materials transport networks to supply the core, while the returns from these investments have become lower and lower.

Innovations and cost reductions in international air travel and in international telecommunications, originally planned as one of the themes of the 1996 Political Economy of the World-System annual meeting, have had important impacts on labor mobility across the regions of the world economy in recent years. As was discussed during the Political Economy of the World-System 1995 meeting and the resulting book, these changes have played a major role in increasing migratory flows between peripheral and core regions. The ability to remain connected both physically and informationally to sending peripheral regions allows complex patterns of circulatory migration and accumulation of capital from core jobs for investment in sending peripheral regions; this creates important economic opportunities in peripheral regions.

Finally, a number of areas of future research on space, transport, and communications in the capitalist world economy can be identified. Strong labor unions in transport industries have long characterized many regions of the world economy; this strength is quite likely because of control over the material arteries of capital accumulation. Evidence of this connection can be found in the argument that the maritime labor unions in the United States led to the creation of the institutional mechanism of flags of convenience to allow the use of non-U.S. crews (Cafruny 1987; Nayar in this book). This innovation was adopted by Japanese shipping firms in the post-World War II era to reduce the costs of shipping huge volumes of raw materials to Japan (Bunker & Ciccantell 1995). However, with a few exceptions, the role of labor in transport and more generally in the capitalist world economy remains a major arena for future research.

Transport and communications changes that have fostered tighter integration have created new investment opportunities for both core and non-core capital, but labor's opportunities for capturing benefits have been curtailed by lowered costs of increasingly distant and spatially separated phases of the production process. For example, the North American Free Trade Agreement has created investment opportunities throughout the region for U.S., Mexican, and Canadian firms, but the returns to labor have come under strong downward pressure throughout the region. Similarly, Japanese joint venture investments in manufacturing in East Asia

with local capital have focused on the utilization of cheap labor as an adjunct to capital accumulation in Japan.

The effects of communications technology on industries, national economies, the world economy, and local communities also are emerging as salient issues for analysis. The twin processes of spatial integration and spatial differentiation via communications and transport technologies have created opportunities and challenges to which communities are attempting to respond, whether through assuring high-speed Internet connectivity or efficient, large-scale, computerized container ports. The role of air freight in moving high-value goods, the need for efficient, large-scale airports to load and unload large cargo planes, and the effects of these changes on industries, communities, and economies are similarly important.

Finally, the insights generated by the case studies presented in this book highlight the need both for case studies focusing on issues of space and transport and for more integrative and theoretical examinations of these case studies. World-systems theory provides a framework for analyzing the restructuring of the world economy now underway; closer attention to the issues raised in this volume provides an avenue for advancing our understanding of this process of restructuring and its powerful and often grave social, economic, and environmental consequences.

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About the Contributors

Stephen G. Bunker is Professor of Sociology at the University of Wisconsin–Madison. His research examines how the world economy is driven by raw materials and transport, including the role of the Brazilian Amazon as a raw materials periphery and the political economy and ecology of Japanese raw materials access strategies.

Paul S. Ciccantell is Assistant Professor of Sociology at Kansas State University. His current research interests include the socioeconomic and environmental impact of raw materials extraction in Brazil, Mexico, Venezuela, and Canada; the organizational sociology of raw materials and transport industries; the impacts of the North American Free Trade Agreement; and the political economy and ecology of Japanese raw materials access strategies.

Robert P. Clark is Professor of Government in the Department of Public and International Affairs and Director of an interdisciplinary program in the study of global systems at George Mason University. His most recent book is *The Global Imperative: An Interpretive History of the Spread of Humankind*. He is currently working on a study of the biological dimensions and consequences of globalization.

Wilma A. Dunaway received the 1995 Dissertation Award from the American Sociological Association for research from which her chapter is drawn. She is author of *The First American Frontier: Transition to Capitalism in Southern Appalachia, 1700–1860* and several articles about capitalist incorporation of the eastern Cherokees, ecological degradation, and the transformation of women's work.

R. Scott Frey is Professor of Sociology at Kansas State University. His work has appeared in several recent books on environmental issues and in numerous journals including the *American Journal of Sociology* and the *American Sociological Review*. He is currently working on a text entitled *Society and Environment*.

John Gulick is a doctoral candidate in Sociology at the University of California–Santa Cruz. His principal areas of research interest include the political economy of global capitalism (especially the Pacific Rim) and the political economy of the built environment.

Richard Lee is Scientific Secretary of the Fernand Braudel Center. He has published in *Review* (of the Fernand Braudel Center) and *Historical Social Research* and wrote “Structures of Knowledge” in *The Age of Transition: Trajectory of the World-System, 1945–2025*.

Jonathan Leitner is a doctoral candidate in Sociology at the University of Wisconsin–Madison.

Baldev Raj Nayar is Professor of Political Science at McGill University.

Saule Omarova is a doctoral candidate in Political Science at the University of Wisconsin–Madison.

David Smith is Associate Professor of Sociology and Urban Planning at the University of California, Irvine. He recently wrote *Third World Cities in Global Perspective: The Political Economy of Uneven Development* and coedited *A New World Order? Global Transformations in the Late Twentieth Century* (Greenwood, 1995). His current research focuses on East Asian political economy, the structure of global commodity chains, and race and ethnicity in world cities.

Philip E. Steinberg is Assistant Professor of Geography at Florida State University. Besides his work on transportation and communication

spaces, he has published on environmental history, industrial history, social movements, and the politics of urban planning. His present research applies his analysis of the “real” transportation-communication space of the world ocean to the “virtual” transportation-communication space of the Internet.

Michael Timberlake is Professor of Sociology, a member of the Women’s Studies faculty, and Chair of the Department of Sociology, Anthropology and Social Work at Kansas State University. He is particularly interested in understanding how local communities articulate with broader social, economic, and political currents. Timberlake recently contributed chapters to *World Cities in a World-System* and *Forgotten Places: Uneven Development in Rural America* and articles to *Journal of Urban Affairs* and *Urban Studies*.