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Operating Rules in Organizations

Macroeconomic and Microeconomic Analyses

Bénédicte Reynaud

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Also by Bénédicte Reynaud

LE SALAIRE, LE RÈGLE ET LE MARCHÉ
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Macroeconomic and Microeconomic Analyses

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To Jean-Louis

‘Rules do not follow from an act of comprehension.’
— **Ludwig Wittgenstein**, *Wittgenstein’s Lectures, Cambridge 1932–5*

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BÉNÉDICTE REYNAUD

List of Acronyms

AME	Atelier de Maintenance des Equipements Electroniques (Electronic Equipment Maintenance Workshop)
ANACT	National Agency for the Improvement of Working Conditions
BPU	Basic Production Units
BOU	Basic Output Unit
BTE	Bureau des Temps Elémentaires
CGT	Confédération Générale des Travailleurs
DEC	Convention d'Expérimentation de la Démarche d'Efficacité Collective'
DGCC	General Department of Competition and Consumption
EMS	European Monetary System
ERI	Interval Revealed by the Employer
GAT	('Grade drift'), seniority ('Ageing') or enhanced skills ('Technicity')
GNRI	Government's Non-Revealed Interval
IMF	International Monetary Fund
MRF	Matériel Roulant Ferroviaire (Rail Rolling Stock Department)
NTR	Nothing to Report
RATP	Régie Autonome des Transports Parisiens (Parisien Transport Company)
RI	Revealed Interval
SMIC	Salaire Minimum Interprofessionnel de Croissance (growth-linked minimum wage)
SMIG	Salaire Minimum Interprofessionnel Garanti (annual wage guaranteeing a minimum standard of living)
VI	Viability Interval
WOU	Weighted Output Units
WRI	Interval Revealed by the Worker

General Introduction

Attempts to execute employment contracts constantly come up against problems of interpretation. To express the difficulty in concrete terms, when an employer gives an employee an instruction, how is the latter to comply with that instruction? With what level of commitment? How are employees to interpret the injunction to work diligently if, as Marsden (1999: 155) notes, 'Diligence concerns partly how hard people work and the care they take on their jobs, but also their time-keeping, attendance and general reliability'? In the 19th century, factory rules, in France and elsewhere in Europe, stipulated that workers guilty of 'negligence in the execution of their work' would be fined, but how was negligence to be defined? Similarly, how do employers go about controlling work and, in particular, how do they measure work intensity? Companies in the English-speaking world go even further by formulating strategies likely to help them obtain the maximum 'discretionary effort' from their employees. Employers in Continental Europe, who tend to reduce this problem to one of work intensity, still largely ignore it. In general terms, how do employers and employees decide to trust each other in the absence of any guarantee about the other's intentions and of any means of obtaining such a guarantee, since it can never be known whether a guarantee of intent (such as a written IOU given to a friend) is merely an intent to guarantee (that is, a promise designed to reassure the friend, who will not be reimbursed)?[1] These questions reflect the specificity of the wage relationship, which Marx (*Capital*, Volume 1: 502, note 1) described in the following terms: 'If you call labour a commodity, it is not like a

commodity which is first produced in order to exchange, and then brought to market where it must exchange with other commodities according to the respective quantities of each which there may be in the market at the time; labour is created the moment it is brought to market; nay, it is brought to market before it is created.'[2] Marx is expressing here what modern economists call 'the incompleteness of the labour contract'.[3] This incompleteness makes it necessary to refer to current uses and existing rules in order to clarify the various aspects of the wage relationship.

Although there are many economists who take the view that prices are not the only tools of coordination and that rules or control exerted through a management hierarchy are necessary, there is little research that explains how rules fulfil their function in such a way that they can be said to facilitate exchange and hence coordination.

After all, in the standard model, individuals are intent primarily on following their own interests, which perhaps involves following rules.[4] But what do we mean when we say that those individuals are following the rules? In effect, they are complying with a constraint on their utility maximization plan. Such a constraint helps to make the rule compatible with individual interests. Moreover, the rules are regarded as instruments that can bring the particular interests of the members of the same organization into line with each other. Such rules complete employment contracts, since theorists assume that they are applied mechanically. Incentive theory is undoubtedly the approach that has most explicitly developed this notion of rules (Holmström, 1979; Grossman and Hart, 1986). However, such a technical and instrumental view of economic rules ignores the fact that these rules are also social, in the sense that they are applied in a real world and not in the imaginary world constructed by theoreticians to satisfy their scholarly requirements.

However, other schools of thought, which are very diverse in their approaches but can be said to share a common reference point in the notion of convention developed by the philosopher David Lewis (1969), attempt to explain collective dynamics at the macro- or micro-economic levels on the basis of rules, conventions or norms.[5] A by no means exhaustive list of these schools of thought would include evolutionary theory (Dosi *et al.*, 1988; Egidi, 1992; Young, 1993, 1996), theories of complementarity and institutional hierar-

chy (Aoki, 2001), the economics of conventions (Dupuy *et al.*, 1989, Orléan, 1994) and theorists of the firm, such as Leibenstein (1982). However, all these non-market forms of coordination are totally abstract. The evolutionary approach that draws on genetic algorithms has imported the notion of rules from artificial intelligence: rules rigorously define the action that will be triggered when certain conditions are fulfilled (Cohen *et al.*, 1996: 45, Dosi *et al.*, 1997). The logical expression corresponding to this notion is 'If X, then Y'. Individuals internalize the same rules, which eliminate any question about how those rules operate (Egidi, in Cohen *et al.*, 1996: 45). For the other evolutionary approach, which draws on game theory (Young, 1993, 1996), coordination denotes the selection of one state of equilibrium from among several possible ones. Leibenstein investigates how the wage relationship can function when the employment contract is incomplete and effort is a discretionary variable. The solution is to agree implicitly on an 'effort convention' determined by the average effort level in the group (Leibenstein, 1982: 94): 'Entrants to the firm observe the average effort level, and set their own effort approximately at or fairly close to the observed average.' The difficulty with this type of solution is linked to its self-referential nature, to use the term adopted by Orléan (1988). In other words, individuals adapt to a norm that they are in the process of establishing. Finally, advocates of the conventionalist approach perceive rules as 'collective cognitive mechanisms'. What are the empirical arguments underpinning the notion that rules fulfil their functions by virtue of their cognitive dimension? How can the cognitive dimension, in and of itself, facilitate coordination in the real world?

In reality, economists have not tackled the question of how rules act, perhaps because it is too concrete an issue to be of concern to them, one better left, in their view, to sociologists. Economists prefer to approach what they regard as 'too concrete' by adopting the concept of rational behaviour and decision-making. From this point of view, there is no point in examining the consequences of a solution since it is, by definition, optimal. Thus decision theorists stop at the threshold of a theory of action. The rational behaviour paradigm has many cleavages. The greatest modern economists, such as Sen and Simon, both Nobel prize winners, have criticized the assumption that individuals always seek to maximize their own

interests: 'The main issue is the acceptability of the assumption of the invariable pursuit of self-interest in each act' (Sen, 1979: 109) and criticized the paradigm for its inability to account for the reality of routine behaviours. Although these criticisms have given rise to a number of studies, the question is enormous in its scope and the way in which rules function remains largely unexplored. It is organizational theorists who have tended to focus most on these questions (March and Simon, 1958; Cyert and March, 1963). The book by March *et al.*, (2000) on changes to written rules in organizations shows, once again, that advances in the understanding of rules are still coming from this school of thought. Nevertheless, their research does not really deal with the question of how rules operate. As for macro-economists, whether of a neo-classical, Keynesian or Marxist stripe, the highly aggregated level at which they conduct their analyses does not allow them to take account of rules.

When they have not simply ignored the question of rules, economists can be said to have developed a theory of how to resolve a theoretical problem (namely, how do rules operate?) by adopting a theoretical and abstract point of view. If we accept the criticisms levelled by Simon, Sen or Leibenstein, what needs to be done now is to develop a theory of how practically to resolve this very practical problem.

Rules are generally considered as resources to be drawn on in the execution of employment contracts; however, they do not eliminate the uncertainties of the wage relationship. The basic explanation for this is not, as most economists suggest, to be found in the notion of 'bounded rationality', which is a tautology, but rather in a fundamental property of rules, namely their distance from the solution. On this point, the present book draws heavily on Wittgenstein's contribution to the understanding of rules and attempts to use his insights in a creative way that takes account of the way in which rules operate, the blind spot of economists whose concepts of rules are so underdeveloped that they leave us incapable of analysing any reality at all. In the world as seen by economists, rules operate in the same way as 'rails compelling a locomotive', to use a metaphor cherished by Wittgenstein (BGM,[6] I § 116). For him, rules are not an external description of a procedure that has to be internalized in order to produce a particular behaviour. They have no meaning outside of their practical application. Indeed, it is their practical

application that gives meaning to rules. From this point of view, the idea that the signatories to an employment contract mobilize rules, which seems so simple to economists, turns out in reality to be extremely complex. What does the mobilization of rules involve in practice? What does it mean to apply and follow a rule? The economic sphere does not escape Wittgenstein's questioning, and there is no reason why it should be otherwise. Wittgenstein does not abandon us to what Kripke (1982) called 'Wittgenstein's sceptical paradox' (PU, § 201), which does not in any case reflect Wittgenstein's position on rules: 'No course of action could be determined by a rule, because every course of action can be made out to accord with the rule'. In *Philosophical Investigations* and *Remarks on the Foundations of Mathematics* in particular, as well as in some passages in *Dictées*, he develops a non-causal approach to rules, which far from being abstract, is absolutely in touch with reality.

The idea of the interpretation of rules is also found in the work of certain legal experts for whom the act of interpretation lies at the very heart of their thinking and practice (Atias, 1982; Jeammaud and Lyon-Caen; 1982; Serverin, 2000). The marks left by past interpretations of legal rules are visible in case law, which itself evolves out of competing future interpretations. Although legal experts are generally less reluctant than economists to accept the interpretative nature of rules, strong resistance is sometimes encountered since rules are frequently confused with laws, which are by definition obligatory in nature and sometimes accompanied by sanctions or punishments, which in many instances gives rise to the perception of rules as mere constraints.

In general terms, rules can be said to be explicit, public statements that trigger an action with a certain degree of predictability but do not determine it (except in the extreme case of a constraining rule). They are both general and abstract. If this is an observation that has to be made, despite its being shared by the legal community,[7] we do so in order to draw a conclusion that is perhaps less banal: the distance between rule and solution is a fundamental property of rules, since it explains why a rule has always to be interpreted. Rules do indeed make it possible to find a solution to a problem, but they do not provide that solution in any detail (Atias, 1982: 216): 'If the content of the rule corresponded exactly to the actual hypothesis,

the prescription would be valid only for the very limited number of hypotheses expressly considered. Even the slightest difference in circumstances would make it impossible to infer the solution from the rule.' Otherwise, there would have to be as many rules as there are problems to be solved, which would destroy the specificity of individual rules. We would then be dealing with another category, which in law, is known as a decision: 'It uses up its effect in an instant even though its consequences may be lasting. In contrast to norms (or rules), which can be applied in a limitless number of cases through the effect of a single edict, decisions exert their effects only step by step' (Jeammaud and Lyon-Caen, 1982: 57). Interpretation is coextensive with the notion of rule. The indeterminacy of rules is the term used to denote this property.

The need for interpretation is reinforced by the fact that rules do not operate in isolation but as part of a system of rules and that, in order to apply a rule, reference frequently has to be made to another rule. In Continental European law, a legal rule is by its very nature incomplete, incapable of application or interpretation in isolation; among all the elements that have to be taken into account, there are the practices and case law created by past interpretations of the rules.

While it is obvious that the obligatory nature of rules, when they have that quality, is a powerful lever for the transmission of their effects, it is far from being the only one. Some rules fail to achieve the objective assigned to them despite being obligatory. Other rules produce a diversity of results despite the fact that, by definition, they have a single objective. Such differences suggest that rules draw their strengths and their limitations from the fact of being rooted in the social world. From this perspective, it would seem important to establish, despite the indeterminacy of intentions and rules, how the latter operate and how they acquire their specific powers. Such knowledge is an economic question because, at worst, it helps us to avoid any involvement with rules that are doomed to failure and, at best, to play a part in creating efficient rules, in the sense that they achieve the desired objective. This book is given over to that very question and naturally draws on practice rather than theory.

It is based on the observation and analysis of the introduction between 1993 and 2001 of a new rule – a team productivity bonus – in the Electronic Equipment Maintenance Workshop of the Paris

Métro and of its effects on the equilibrium of the rule system in force at the time, on the relationship between operatives and the entire set of operating rules, on the strategies the teams adopted in order to maximize their bonuses and, finally, on labour productivity in the workshop. Eight years have elapsed since the introduction of this team bonus, sufficient time to be able to examine with some degree of detachment the ways in which rules operate.

Chapter 1 examines the conditions under which trust is established within the wage relationship when the intentions of the signatories to the contract are not known. It is shown that rules and commitments that are not declared but reflected in action make it possible to remove the uncertainty as to whether each party is going to trust the other.

The focus of our analysis is on the interpretative aspect of rules, and we turn next to the question of whether economists and governments are still 'in control'. What resources can they draw on in order to recommend rules that might be understood and followed by social actors? Chapter 2 examines the case of wage disindexation in France from 1983 onwards in order to show that it is possible to link the interpretative dimension of rules with the need to make them operating rules.

Chapters 3, 4 and 5 pursue this investigation into the way in which rules operate, drawing on our observations in the Paris Métro.

The hypothesis advanced in Chapter 3 is that the way in which rules are established determines their credibility to a large extent. The model of rule formation we highlight is based on a 'lock-in' strategy, the main feature of which is the use of intermediate rules whose margin for interpretation shifts as the negotiations advance. The term 'lock-in' expresses the idea of a loss of freedom on the part of the actors, since reaching agreement on an intermediate rule makes it virtually impossible to go back (in business negotiations, this is called a 'funnel strategy').

Our observation of the modes of work organization and coordination among the engineering workers in the workshop gives the expression 'following the rules' a precise meaning, namely the implementation of routines (Chapter 4). According to the Weberian analysis of rules put forward by Serverin (2000: 221), 'actions that serve to implement a rule' are to be distinguished from 'actions guided by rules', and it is these latter that are the subject of

Chapter 5. The object of investigation here is the strategies adopted by operatives for dealing with the rules. The result is a surprising one for those economists who believe that rules are like 'rails laid invisibly to infinity', to use Wittgenstein's expression (PU, § 218). The same rule produces different effects in different but comparable teams. These differences are attributed, on the one hand, to *habitus*, that is, following Bourdieu, the aptitudes or dispositions of individuals to adopt certain practices[8] and, on the other, to the style of individual teams. Chapter 6 brings together all the lessons of the empirical analysis in order to develop a practical theory of the way in which rules operate, a theory based in essence on the notion that a meaning of a rule lies in its uses; while uses reflect what it is normal to do, practices depend on individuals' *habitus* and dispositions to implement routines, which are nothing other than rules that have already been interpreted.

1
Trust and the Wage Relationship

Unlike the other social sciences, economics did not discover the importance of trust in economic relations until relatively recently, at the end of the 1960s. Arrow (1968: 538) undoubtedly had a decisive influence on this new awareness: 'One of the characteristics of a successful economic system is that the relations of trust and confidence between principal and agent are sufficiently strong so that the agent will not cheat even though it may be 'rational economic behavior "to do so".' As soon as the first cracks appeared in the standard paradigm, when Sonnenschein (1973), Mantel (1974) and Debreu (1974) demonstrated that there was no stability in equilibrium, a space was opened up for notions such as fairness, loyalty and trust that were foreign to the discipline and hitherto unthinkable. The pendulum then swung, as it were, and interest in trust intensified.[1]

A fundamental line of cleavage can now be discerned between those analyses that, in essence, regard trust as a rationale characterized by calculation and self-interest and those that see it as the expression of a social and collective reality that cannot be reduced to rational calculation. Three approaches to trust can be discerned:

1. trust as accumulated capital: from this point of view, trust is conceived in terms of individual concerns to maintain their reputation (Kreps, 1990);
2. trust as risk: all transactions can be reduced to a calculation of the costs and benefits to be derived from a relation (Williamson, 1993);[2]

3. trust as individuals' belief about economic relations: in this case, trust depends on wider social networks (Granovetter, 1985; Gambetta, 1988).

However, none of these approaches takes as its starting point one essential characteristic of trust, namely its *radical indeterminacy*. Merely establishing trust between an employee and his or her future employer (and conversely) requires not only knowledge of the other party's intentions but also a willingness to give credence to only one possible interpretation, namely the one that makes it possible to establish trust. However, before an employment contract is executed, there is nothing to indicate what the 'correct' interpretation might be. The decision to trust the other party creates an indeterminate situation.

Thus the search for guarantees that will contribute to the maintenance of trust is fundamental. This chapter is devoted to an analysis of such guarantees in an attempt to define the conditions under which some of them might remove the indeterminacy surrounding intentions. Three forms of trust[3] will be identified on the basis of their degree of irreversibility and stability: *contractual*, *tacit* and *organizational trust*. Considered solely at the individual level, it would seem that promises and, more generally, contracts are not sufficient to remove this indeterminacy. Contractual trust is, therefore, unstable. On the other hand, rules, by virtue of their inertia, impart a certain degree of irreversibility to trust. Here too, a distinction has to be made between tacit and organizational trust. The former gives the illusion of being based on nothing. In reality, it is grounded on social conventions that are accepted as such by most individuals, with the result that they do not seek explicit expressions of guarantee. The latter depends on rules, which are by definition explicit, and on implicit commitments. These are necessary conditions for the establishment of this kind of trust, but they are not sufficient to ensure its stability.

The difficulty of establishing trust: the problem of intentions

Trust: an asymmetrical and reciprocal commitment

Following the example of Dasgupta (1988: 53), trust is often seen as 'one's expectations regarding to others' choice of actions that have a

bearing on one's own choice of action'. In a sense, there is nothing to add to this statement, since all expectation relies on representations and beliefs. In another sense, however, the statement says nothing at all, since this definition of trust does not help us to distinguish trust from all anticipatory behaviours. Some light can be shed, as Karpik suggests (1989; 1996: 528), by introducing the notion that trust is a form of delegation: 'In placing trust in someone or something, I am recognizing an authority that is going to take the form of a principle guiding my own actions'. However illuminating this notion might be, however, it does not help us establish a clear distinction between trust and authority.

For this reason, we adopt the following definition: trust is a delegatory relationship based on anticipation of the delegatee's behaviour. The asymmetry and reciprocity of the commitment are the two essential and indissociable characteristics of a trust relationship. The first arises out of the very act of delegation. The second – the reciprocity of the commitment to the relationship – stems from the fact that the act of delegation is not one that is committed blindly, since if this were the case it would more properly be called an act of submission.

In formal terms, an individual X places trust in Y (the delegatee) in respect of an action A if and only if:

1. X expects Y to do A in the circumstances that permit and trigger action A.
2. X and Y presuppose that there is some uncertainty as to whether Y will do A. This uncertainty is presupposed but not made explicit.
3. X leaves this uncertainty aside without attempting to measure it by assigning a probability to it or to limit it by imposing additional constraints (actions, for example).
4. X himself acts as if Y was going to do A in the circumstances in question.
5. All the preceding conditions (1 to 4) also apply to Y.

Each of these conditions may seem trivial; the complexity of trust lies in reality in the way they are ordered. Condition 1 places the emphasis on anticipation. Condition 2 stipulates that trust cannot exist outside of a context of (informational or strategic) uncertainty

as to each party's intentions, competences, etc. The asymmetry of the relationship arises out of this. Condition 3 refers to the act of delegation. Condition 4 arises out of the fact that, when X performs an act of delegation, Y gains credence in return. Thus condition 4 defines the norm of reciprocity that underlies and sustains the dynamic of trust.

The employment contract as developed in Simon's model (1951: 294) might be regarded as a good illustration of the notion of trust, even though it is not that model's explicit objective. 'We will say that W [the worker] enters into an employment contract with B [the Boss] when the former agrees to accept the authority of the latter and the latter agrees to pay the former a stated wage (w).' For Simon, submission to authority means that the worker undertakes to perform certain tasks chosen by the employer in accordance with the evolution of the economic situation. These tasks are selected from a more extensive set of tasks agreed beforehand by the two parties. On the one hand, an employment contract establishes a mutual commitment between the employer and the worker: the former undertakes to pay a certain wage, while the second agrees to perform the tasks required. On the other hand, it establishes a relationship of subordination, since the decision as to which tasks are to be carried out rests with the employer. Thus the two essential characteristics of a trust relationship, namely the reciprocity and asymmetry of the relationship, are found in employment contracts.[4]

The notions of trust, legitimacy and credibility are so close to each other as to make it very difficult to distinguish one from the other. Nevertheless, the differences between them have to be clarified, even though this may be something of an academic exercise, since to leave them unexplained would inevitably give rise to subsequent confusion. Credibility is an attribute of someone who has accumulated a stock or fund of trust. Trust is a relationship, either between two individuals or between an individual and an institution or authority. Since there is no element of reciprocity in credibility, this term is reserved for (political, technical, etc.) authority or power or for its representatives. When the term is used of an individual, it is intended to denote that individual as the embodiment or representative of power or authority. Legitimacy, finally, denotes the processes through which a community accepts an authority. Trust describes the link between the individual (or individuals) and this legitimate power or authority.

Contractual trust as situated indeterminacy

Contractual trust, which is based on promises and contracts, cannot eliminate the indeterminacy surrounding intentions. Indeed, even if one of the two contracting parties seeks to obtain from the other indications as to his or her intentions, such as behaviour or promises that might justify the establishment of trust, the situation remains indeterminate, in the following sense. Let A and B be two divergent propositions. Proposition A is indeterminate if, in one and the same situation, two contradictory interpretations are possible. Indeed, at least one of the premises in the argument deployed in support of interpretation A can also be deployed as at least one of the premises in another argument leading to conclusion B, which is incompatible with interpretation A.

Let us take the example of signalling theory, as developed by Spence (1973; 1974).[5] When labour is being recruited, the number of years' education is not a sufficient signal to firms seeking to choose among the various candidates, since certain characteristics, such as competence, cannot be observed *a priori*, or at least only at prohibitive cost. In the case of unemployed candidates, it is not in their interest to offer to work for lower rates of pay than those currently on offer, since this would imply that they are less productive and would obviously not enhance their chances of being recruited. There is another strategy, which is to use their educational qualifications as a signal of quality. This is what Spence explored. He demonstrates that, contrary to expectations, this strategy places employers in an indeterminate situation. Why is this? A simplified form of the argument runs as follows. A signal is a cost that varies as an inverse function of productivity. By signalling his or her level of education, a candidate is revealing his or her potential productivity to an employer. The decision by a higher quality worker to signal imposes a cost on lower quality candidates. If the best candidates signal their quality, the average productivity of the others declines, together with their earnings. Thus, in order to avoid this drop in average earnings, the least skilled workers are also going to signal. This incentive to signal spreads to all workers, which produces an adverse selection effect. Thus the signal loses its function as a source of information about worker quality. Under these circumstances, it is impossible for an employer to ascertain whether the employee is signalling in order to: *1. convey the intention of guaranteeing his or her*

quality (and to bluff); or 2. to give a guarantee of intending to be equal to the declared competences.

Let us now take the example of the concluding of an employment contract. Both employees and employers may sign the contract for two conflicting reasons: 1. in order to give a guarantee of intending to keep to their respective commitments, as laid down in the contract (in the employee's case, the commitment is to perform tasks a, b and c, in the employer's case, to pay the agreed salary); or 2. to give an intent to guarantee, just to allay the other's uncertainty, while intending to abuse his trust subsequently. It is impossible to know if the other party is giving a guarantee of intent or whether he is simply demonstrating an intent to guarantee.

At the level of the individual, therefore, the search for an explanation of the other party's intention does not provide a basis for the establishment of trust. This strategy, in which both parties seek guarantees of the other's intention, leads to an indeterminate situation. Contractual trust is, therefore, unstable. So how can trust be established?

Codes and the establishment of trust

Social conventions and tacit trust

Tacit trust is based on social conventions. These are behavioural regularities (R) adopted by the members of a society. Pressure to conform to them is social rather than legal in character (Jones, 1984). Each individual conforms to R, each individual expects others to conform to R and each individual prefers to conform to R, provided that others do so as well. Thus social conventions are socialized modes of action that remain implicit, impersonal and anonymous. Moreover – and this is an essential element in our argument – the norms are accepted by the majority of individuals, at least for a certain period, which gives them legitimacy. Thus corporate practices and the codes relating to ties of kinship and of friendship are examples of social norms. Let us take the example of a sum of money loaned by one friend to another: conventions relating to friendship require that no contract should be drawn up and that, if one of the friends suggests or even insists that there should be one, the other will not enforce it.

In tacit trust, the influence of common practices or customs is such that any uncertainty as to future behaviour is disregarded. Thus compared with the general definition given in section above, condition 3 is weakened. As a result, a space is opened up, an interval in which each party foregoes the search for any expression of intents to guarantee. Thus tacit trust seems to dispense with social conventions and with the signs through which they find expression. In reality, they do have an effect, but with a lag that might be compared to a hysteresis effect. From this point of view, if X gives positive signs, Y regards them not as *necessary but as sufficient*, and he is able to put his trust in the other party. Similarly, if X finds himself wanting in coordination, Y considers the deficiency to be normal and does not see it as grounds for breaking off relations. On the other hand, if X ceases to give any signs for a certain period of time, they become necessary to X, who loses trust if they fail to materialize. This dialectical evolution of the signs obviously has to take place in a context in which no contrary indications are required, such as contractual requirements or declared intentions to break off cooperation.

An example of tacit trust

Cooperation among workers in Japanese firms is most revealing in this regard. It is customary in the Japanese workplace to cooperate and to help one's co-workers if necessary. Individuals make good their own errors or shortcomings by calling on others to help out, which is considered normal and natural. The founder of Toyotism, Ohno (1989: 36), stressed the importance of learning and cooperation: 'supervisors must take workers by the hand and teach them what they have to do. In this way, their workers will come to trust them. At the same time, operatives working on the same line have to learn that they depend on each other and that they must therefore help each other'. As Magaud and Sugita (1991: 17–18) have written: 'Dysfunctions are not denied or concealed but foreseen and planned for. ... Dysfunctions are part of productive activity and the solution must be a collective one, just as production is a collective activity.' This is why no attempt is made to punish individual mistakes or shortcomings but to put them right as quickly as possible.

Tacit trust in economic theory: Akerlof's model

By its very nature, tacit trust is rare in economics, tending to remain more in the background. However, Akerlof's article (1982) on the effort norm can be seen as an attempt to model tacit trust, even though this was not the author's explicit concern. Workers in the firm studied by Akerlof coordinate their effort in order to determine collectively an average level of effort to provide, which is far above the minimum required. In period *t*, workers significantly exceed the minimum required (by +17 per cent) but without demanding a pay increase or promotion. Thus they are signalling their willingness to cooperate, but the effects of those signals are deferred. If during period *t*+1, the minimum level is not attained, the employer will consider first the results of period *t* (+17 per cent) rather than those of the current period (*t*+1). He interprets the failure to achieve the minimum level of effort merely as an unfortunate circumstance and not as a change of strategy. This unfortunate circumstance does not call into question the foundations of the mutual trust that has been established. Thus the signals given during period *t* are *sufficient*. This is what makes it possible to explain why Akerlof argues that exceeding the norm enables a group to protect itself against the collective failure that would take place if one of the workers did not produce the minimum level of effort.

On the other hand, if the minimum level is still not achieved in period *t*+2, the employer will no longer interpret this divergence from the norm as an unfortunate, one-off accident but rather as a change of strategy and a breakdown of tacit trust. The signals given during period *t* are no longer sufficient. Akerlof's model can be regarded as a model of tacit trust based on *a time lag in the use of signals*.

Rules and organizational trust

Organizational trust is based on rules which, when applied, activate commitments that find expression in modes of behaviour and not simply in declarations that serve no useful purpose. Now these modes of behaviour necessarily place constraints on the individual involved which, by their very nature, serve as guarantees for the other party. Locked into a *path dependency* dynamic (David, 1994), such commitments create their own irreversibility, which maintains trust when it is not possible to create it.

In organizational trust, uncertainty about the other's intentions polarizes around the nature of the collective goal, which is seen as a sort of scapegoat. Let there be a rule that imposes a collective action C. This rule may, for example, govern employees' participation in the company's collective results. Let A and A' be two actions that are necessary to bring about C. Actions A and A' must be coordinated, which places constraints on A and A'. The uncertainty arises out of the fact that X is not certain either that Y has exactly the same idea as him of C and of A' (and vice versa) or that Y still wishes to be involved in C. However, as soon as X observes that Y has restricted his own opportunities for action in such a way as to do A' rather than anything else, and as long as X can think it reasonable for Y to impose this restriction on himself, then X assumes that there is an implicit commitment on Y's part (and vice versa).

Organizational trust in practice

Employees' participation in the firm's collective results or, more broadly, profit sharing in general, constitutes a pay rule that brings into play something akin to organizational trust. Let us take the case in which profit sharing is conceived solely as a microeconomic incentive mechanism.[6] When a rule governing employees' participation is introduced, it is in the interests of both employer and employees to maximize the company's profits, which makes cooperation necessary. This places additional constraints on them. Employees have to organize their work more efficiently, while the employer has to pay increased attention to the flow of information, etc. Profit sharing leads each party to take actions that will limit their room for manoeuvre in the future. As soon as employees commit themselves to cooperating with management, it becomes more difficult for them to adopt a radical change of strategy at least if it is assumed they are agents whose behaviour is consequentalist. From this point of view, the pay rule encourages implicit commitments that make it possible to establish organizational trust.

Let us turn now to an analysis of the role of collective commitments in organizational trust based on an example drawn from our study of the RATP workshop.[7] The team productivity bonus varies in a linear direction within an interval: operatives receive nothing if their team remains below the first threshold that is the production 'floor'. On the other hand, they receive the maximum bonus if their

team reaches or exceeds the second threshold, that is the production 'ceiling'. Each operative must determine for himself a level of cooperation that will produce the bonus he desires.[8] Since they all follow the same argument and since they all form an idea of the others' decisions, each operative has his own notion of the team action C, which may as a result be different from those of his co-workers. The uncertainty among the operatives as to their co-workers' decisions arises, first, out of the possible differences in individual ideas of what constitutes C and, secondly, the possibility that each worker might change his degree of commitment and therefore his own idea of C. However, through mutual observation of actions A and A', workers are able to assure themselves of the soundness of the cooperative effort. Let us assume that actions A and A' equate respectively to corrective and preventive maintenance operations on the Metro's electronics. Furthermore, depending on its needs, the logistics department lays down rules for prioritizing work between A and A', rules to which operatives are not indifferent, corrective maintenance being always preferred to preventive maintenance, which is regarded as dirty, repetitive work. The strength of the implicit commitment and the degree of organizational trust can be assessed by observation of operatives' compliance (or otherwise) with these rules and of their working practices. If operative X notes that Y is adhering to the rule of the moment, which obliges him to do A', that is preventive maintenance, which X knows he detests, then X can assume that: 1. Y is committing himself implicitly; and 2. that he is doing so in a 'reasonable' or 'normal' way, since at the moment of observation A' is an objective constraint.

Organizational trust in economic theory: efficiency wage models

We interpret efficiency wage models (Akerlof and Yellen, 1986) as strategies for suspending the radical indeterminacy surrounding the decision to trust. Each of these models is based on the same rule: a wage higher than the market wage, which gives rise to different implicit commitments and whose actual outcomes are a reduction in labour turnover (Stiglitz, 1974), the flushing out of 'shirkers' (Shapiro and Stiglitz, 1984), etc.[9]

Thus Stiglitz (1974) shows that even during a period of unemployment, it is optimal for firms to pay above the market rate for some

jobs. Such a pay differential reduces labour turnover, thereby minimizing firms' total costs, including hiring, dismissal and training costs.

The same type of argument applies to the 'shirking' model developed by Shapiro and Stiglitz (1984). Given the difficulty, not to say the impossibility of monitoring and measuring effort, how can workers be encouraged to work? Even if it pays wages above the market rate, a firm cannot eliminate 'cheating'. Moreover, all other firms are likely to adopt the same strategy, which would remove the pay differentials and thus the incentive not to shirk, since any employee who was dismissed would be able to find another job at the same rate of pay. In the Walrasian paradigm, it is even in an employee's interest not to make any on-the-job effort at all. Indeed, dismissal, which is the worst sanction that can be imposed on an employee, is a wholly ineffective mechanism in a competitive economy, in which there is by definition no unemployment. The credibility of the threat of dismissal is restored by the following mechanism. In accordance with the traditional labour demand function, a wage increase has the effect of depressing the demand for labour and increasing the unemployment rate. This latter becomes a real incentive to work. The increase in labour productivity that is one of the expected consequences of this strategy is the visible, quantified manifestation of the implicit commitments obtained.

These models illustrate the dynamic of organizational trust. By introducing incentive rules, firms are seeking to obtain from their employees guarantees of intent to act honestly and be loyal. If the degree of incentive is sufficiently high, workers will be willing to remain with their employer in order to put their competences at his service and provide a certain level of work intensity. This amounts to guarantees of intent to honour the trust that has been established.

The conditions for stabilizing trust

The three forms of trust – tacit, contractual and organizational – are attempts to remove the indeterminacy surrounding the decision to trust. Two things need to be emphasized. First, these various forms of trust are not substitutable, since the trust encountered in practice

contains elements of all three. Secondly, the indeterminacy is either not removed (contractual trust) or only partially (organizational trust). Clearly, therefore, the stability of the trust that is established cannot be taken for granted. What conditions have to be met if the various forms of trust are to become stable? The necessary conditions are two in number. The rules that have led to the establishment of trust must: 1. create irreversibilities; and 2. operate within a given interval.

Condition 1: the creation of irreversibilities

The various forms of trust do not have the same degree of stability since the underlying mechanisms have different effects on the strength of the mutual commitments and hence on the extent to which the relationship is irreversible. In this chapter, irreversibility denotes 'any change that cannot be cancelled out by an action symmetrical to the initial action, even though it may be annulled by an adequate combination of other actions' (Boyer *et al.*, 1991: 22). Cohendet (1997: 79–82) makes a distinction between 'subjective' and 'objective' irreversibility. The former denotes a configuration in which an individual locks himself into a decision, despite the fact that he still enjoys a certain room for manoeuvre; in the latter, an individual is faced with a reduced range of possible choices.

An employment contract might, under certain conditions, give rise to a subjective irreversibility that leads an individual to abide by a decision, namely to comply with the contract, although no external authority is forcing him to do so and he still enjoys room for manoeuvre. In neo-classical theory, however, the pursuit of individual interests is stronger than the desire to abide by the decisions taken.

Social norms and rules that reduce the range of possible choices are the basis of objective irreversibility. A return to the previous state is possible, but only at a price (financial penalty, loss of reputation, etc.). On the one hand, there can be little doubt about the constraining nature of social conventions, because of the pressure of conformism (Jones, 1984). On the other hand, rules are explicit mechanisms that reduce the sphere of the possible. Objective irreversibility is said to be specific to tacit and organizational trust. Table 1.1 presents a characterization of the various types of trust in terms of their mediums, the degree of irreversibility and the theoretical models that best represent them.

Table 1.1 Types of trust and irreversibilities

Types of trust	*Mediums*	*Degree of irreversibility*	*Models*
TYPE 1: Contractual trust	Contract	Reversibility or low irreversibility. Unstable form γ transformation into Type 2 or Type 3	– Employment relationship: Simon (1951) – Signalling theory: Spence (1973; 1974)
TYPE 2: Tacit trust	Social conventions	Strong irreversibility	– Effort norm: Akerlof (1982)
TYPE 3: Organizational trust	Rules (e.g., $w^C > w^*$) that trigger a commitment (w^C: current wage; w^*: market wage)	Strong irreversibility	– Efficiency wage: Stiglitz (1974); Shapiro and Stiglitz (1984)

Two points should be emphasized. First, there tends to be a relationship between the various forms of trust and the degree of irreversibility produced. Secondly, there is not necessarily any difference in the degree of irreversibility produced by tacit trust and that produced by organizational trust. Rules are not in themselves any more irreversible than social codes. What matter is the way in which both are applied: the institutional context, the customs and practices on which they are superimposed and the dispositions[10] of groups and individuals.

Condition 2: the creation of a 'confidence interval'

When a firm introduces a collective profit-sharing bonus, each worker has to decide whether or not to cooperate in the new scheme. However, once the decision has been taken, the individual employee has no guarantee that the deeper intention has been understood, since the rule gives rise to *indeterminacy in respect of the intention to cooperate*.

This can be demonstrated, first, by the case in which an employee X decides to do everything to ensure that his team receives the maximum bonus. He signals his cooperation to his co-workers. However, nobody can regard an apparently favourable signal as

definitive proof of cooperation. The propositions advanced – to work or not to work for the maximum bonus – are contradictory propositions. Thus the proposition: 'he is cooperating in order to secure the maximum bonus' is indeterminate.[11] Indeed, of the possible explanations for employee X's habit of arriving very early in the morning and leaving very late in the evening (making up for lost time, working long hours in order to make up for incompetence, escaping boredom at home and raising his profile in the office), at least one of them (in this case, staving off boredom) could justify employee Y's belief that employee X couldn't give a damn about the bonus!

This argument applies in the same way to the case in which employee X decides not to exert himself in order to ensure that the team is paid a profit-sharing bonus. He arrives late in the morning and leaves early in the evening. However, employee Y can interpret this situation in several ways: certainty that the bonus will be paid, fear that the profit-sharing targets will be revised, tiredness, slacking and so on. If employee Y accepts the first explanation (anticipation of the group result), he will conclude from it that employee X is in fact working to ensure that the group bonus is paid!

In both cases, therefore, each of the employees finds it impossible to determine whether his interpretation of the other's behaviour corresponds to what the latter was actually wanting to indicate. For a single situation, there are two natural language interpretations A and B that are indeterminate. How can trust, which is undermined by this indeterminacy, be stabilized?

First, each party's knowledge of the other's behaviour, acquired in the workplace, the history of past relations between the actors and custom and practice are all factors that reduce indeterminacy. These various elements come together in the notion of 'social network' developed by Granovetter (1985), who argues that individual strategies are embedded within a more extensive system. Secondly, routines, by virtue of their automatic and mechanical nature, and force of *habitus*, 'this tendency to act in a regular manner ... is not based on an explicit rule or law'. (Bourdieu, 1990b: 77), prevent the actors in the organization from enquiring into each other's intentions. These are the rudiments of an answer that require further development, a task that is undertaken in Chapters 4 and 6.

Finally, it should be emphasized that employees are able to dispel this indeterminacy only within certain limits, limits denoted in this case by the term 'confidence interval', within which nobody enquires into the intentions of others. Within this interval, employees and employers are agreed on a certain degree of tolerance when faced with a failure of coordination, the emergence of 'free riders', etc. Thus organizational trust acquires stability within this tolerance zone.

Conclusion

Under what conditions can trust be established and stabilized? The various theories of the wage relationship provided a fertile starting point for investigation of this question. We also drew on certain empirical observations in order to prevent us losing our way in an analysis blinded by pure theory. Many other difficulties remain, of course, beginning with the extent of the problem, which had to be reduced to a reasonable size.

Thus of the three principal approaches to trust, we decided to investigate in greater detail the one in which trust is regarded as a belief the individuals involved hold about a relationship. Trust was defined as a delegatory relationship based on anticipation of the delegatee's behaviour. On the other hand, since trust is linked to intentions, we explored the conditions under which it is established, taking as a starting point an essential characteristic of trust, namely its radical indeterminacy. Indeed, how can we know whether others are acting in such a way as to guarantee their intention to honour their trust or simply in order to give an intent to guarantee? Thus the initial question took shape: the search for the conditions under which trust can be established involves explaining how this indeterminacy can be dispelled.

We reached four main conclusions. First, the solution to the problem posed by the indeterminacy of trust lies in the differentiation and hierarchization of the various forms of trust – contractual, organizational and tacit – on the basis of their degree of irreversibility and stability. Secondly, contractual trust is unstable because it comes up against the problem of guarantees of individual intentions. This leads to the third conclusion: rational evaluation by individuals cannot by itself establish trust, which is based on collective

beliefs, practices and rules. Fourthly, two conditions for the stability of trust were identified: the creation of irreversibilities through adherence to a rule and the creation of a 'confidence interval' within which different interpretations of contradictory individual strategies are tolerated. Thus the viability of the various forms of trust depends on the ability of institutions and organizations to create rules that are likely, when applied, to produce an interval in which tolerance of mutual intentions is the norm.

2
Wage Disindexation in France and the Incompleteness of the Employment Contract

Until 1983, the indexation of wages to past prices, which, with the exception of the minimum wage, the SMIG,[1] had actually been forbidden by law in 1958, was, nevertheless, common practice in France. It had even been enshrined in a number of collective agreements, including those covering the metal and rubber-processing industries,[2] which meant that wage indexation was applied to all employment contracts in firms covered by such agreements. This aspect of the management of the wage–labour nexus shows, first, that customs are sometimes much stronger than rules, even those emanating from the state, and, secondly, that a rule has no meaning until it is put into effect, a point to which we will return later in the book.

In launching a campaign to enforce the prohibition of wage indexation, the socialist government of Pierre Mauroy was challenging one of the fundamental elements of the Fordist wage regime, namely the continuous increase in wages relative to the cost of living (Benassy *et al.*, 1977; Boyer, 1978). This marked an abrupt break with the past, not only for firms, which had been practising wage indexation for 25 years, but also for workers, who had been guaranteed wage increases based on the past rate of inflation and anticipated productivity gains. As a result, wage agreements suffered an exogenous shock in 1983, which were all the stronger since the ban on indexation was a negative rule. Since it offered no new referent, apart from the government's forecast inflation rate, this rule opened up space for a large number of possible solutions. From this point of view, the disindexation policy brought the structural incompleteness of the employment contract into renewed prominence.

How did firms and employees accept such a radical change at a time when inflation was as high as 14 or 16 per cent? What were the factors that helped to make this policy effective? From a pragmatic point of view, rules are effective if they achieve the intended objective (which may not be the same as the declared objective). In this case, however, can we say that the rules led to achievement of the intended objective?

In this chapter, we explore the hypothesis that it is possible to separate the kind of economic effectiveness that stems from rules and their properties from the kind that is contingent on the economic situation and the political context (unemployment rate, external disequilibrium, inflation, European integration, a left-wing government, and so on). In other words, rules, including their mode of formulation, degree of institutional embeddedness[3] and accompanying rhetoric, could have played a role in the success of the disindexation policy, along with the actual constraints imposed by the economic situation. Wage disindexation does not seem to have been studied from this point of view before.

There are two necessary conditions for rules to be effective: they must be not only credible but also practicable. The first condition reflects the fact that, if wage disindexation in the France of the 1980s was to be credible, the government had to present European integration as an irreversible decision. However, the previous rules also have to be neutralized or destroyed before new rules can be activated. These two points are explored in the first part of the chapter. In the second part, which is given over to analysis of the mechanisms through which economic policy is implemented, the importance of defining a rule by reference to thresholds that reflect a viable representation of the economy is discussed. Finally, a model of how these rules operate is advanced. This model is based on the notions of indeterminacy space and of revealed and overlapping intervals.

The credibility of the disindexation of wages relative to prices

The declared irreversibility of European integration

The turbulence of the years 1981–82 opened up a debate within the French government on the possibility of France withdrawing from the European Monetary System (EMS). Despite the reservations

expressed by the Prime Minister, Pierre Bérégovoy,[4] it was decided at the very highest level to remain within the EMS: 'There was a desire to send one message and one message only … we can't mess about with Europe, we are part of it and we'll just have to manage as best we can … we've entered into an agreement and we mustn't act like spoiled children and simply ignore the agreement when it doesn't suit us'.[5] Thus a preference for political continuity had prevailed over an economic calculation of the costs and benefits of remaining within the EMS, the advantages of which were certainly not beyond dispute. Jobert and Théret (in Jobert, 1994: 54) conclude that 'the economic justifications for the decision that was finally taken amounted to nothing more than belligerent rhetoric'.

This political decision did not merely reaffirm a commitment made three years earlier when the EMS was established. It also established a deliberate strategy that presented European integration as an irreversible process, in the sense that 'change is no longer a justification for returning to the point we started from'.[6] However, this 'fixing' of the future was not merely a feat of political strength, since the notion of European union was permeating all aspects of policy-making. On the one hand, the EMS agreement made provision for arrangements that paved the way for monetary union. A European monetary fund was to be set up and the ECU was to serve as a reserve currency and as an instrument of payment.[7] Although these arrangements were not yet functioning, or only very imperfectly, they nevertheless helped to register European integration in the collective consciousness. On the other hand, in 1982–3, the limitations of the EMS, far from delivering a fatal blow to the process of European integration, paradoxically relaunched it. The Albert-Ball Report (1983), which was produced at the request of the European Parliament, placed particular emphasis on the need to remove the barriers between markets,[8] which against a background of accelerating inflation and volatile interest rates, led irresistibly to the view that the coordination of European economic policies was a virtually irrevocable decision.

The irreversibility strategy caused politicians to transform their relations with the technocrats, that is the experts charged with the task of paving the way, on the technical level, for the integration of the economy into the future European currency system and thus of reducing inflation. By virtue of the tasks with which they had been

entrusted, these technocrats enjoyed an additional legitimacy derived from the state which, in its turn, drew on their economic expertise in order to make the wage moderation policy credible and therefore even acceptable. Thus each power group drew its legitimacy from the other, while at the same time acting as a constraint on the other. A technical constraint is nothing more than a political constraint freely adopted. Europe played an essential role by consolidating this structuring of power. Indeed, the rooting of state expertise in the European project was a precautionary measure that was all the more necessary since economic and social expertise had always been a state monopoly.[9]

Thus Europe served as a justification for pay moderation,[10] the theoretical foundation for which was 'Schmidt's theorem'[11] (Malinvaud, 1982: 10): 'Today's profits are tomorrow's investments and tomorrow's investments create the day after tomorrow's jobs'. However, this statement remains incomplete. It is based on four postulates: 1. investment is a more effective instrument of economic revival than consumption; 2. production depends on a sufficient level of profits; 3. profits are always reinvested; and 4. the restoration of profits depends on the level of interest rates and of wages. Conclusion: wage moderation, a softer expression than wage disindexation, is a necessity. It was one of the pillars of what would later be known as competitive deflation, the genesis of which has been recounted by Lordon (1997).

The economic and social context left little scope for resisting the destruction of the previous model of wage formation. On the one hand, the failure of the economic policy adopted by the incoming Socialist government in 1981 cut the ground away from the feet of policy-makers, dashing any remaining hopes of a Keynesian revival.[12] In particular, the 3 per cent devaluation of the franc on 5 October 1981 and the 10 per cent increase in the statutory minimum wage did not have the expected effects, since other countries fell into a deep recession, which contributed to a widening of the trade gap (55 billion francs in 1981, 102 billion francs in 1982). This adverse economic lag was further compounded by the debt constraint. Because American interest rates were very high as a result of financial liberalization, the debt burden became insupportable for both firms and the state. There was a risk of a loss of sovereignty. By the end of 1982, the balance of payments, already made worse by a sharp rise in the value of the

dollar, deteriorated to the point where it was becoming increasingly likely that the International Monetary Fund (IMF) would have to be called in. This unwelcome prospect had a galvanizing effect: 'As soon as we felt we were in a trap, all other considerations went out of the window, everything had to be brought to a halt and we had to start rebuilding because anything would be better than ending up in thrall to the IMF.'[13] On the other hand, the high unemployment rate and the weakness of the trade unions meant that employees were more disposed to accept the sacrifices required by the 'great watershed of 1983', with the balance of power tilting increasingly in favour of employers (Boyer in Dore *et al*., 1994: 59–60).

The strategies deployed to break the previous model

A move away from management of the 'price–wage loop'

The price and wage freeze introduced in 1982 was a highly significant instrument, in the sense that it broke with a type of economic policy that had prevailed since 1950. Legislation that had come into force on 11 February 1950 had restored the freedom to fix wages, while prices remained frozen. Thus in attempting to manage the price–wage loop, successive governments had given absolute priority to prices, permanent and painstaking control of which was supposed, in theory, to bear down on wages right across the board (Dumez and Jeunemaitre, 1989: Ch. 3). In practice, it was only the evolution of the Salaire Minimum Interprofessionel Garanti (SMIG) that was really influenced, as a result of the introduction in 1952 of a sliding scale for setting the level of the guaranteed annual wage, and the adoption from 1956 onward of an 'indexing policy' that involved scarcely concealed manipulation of increases in the prices of the articles used to calculate the prices index.[14]

This attempt to manage the price–wage loop by focusing almost exclusively on prices was above all the result of a doctrinal position that was stated very clearly by Fourcade, who was then Minister of Economic Affairs: 'The desired change [in the pace of price evolution] may be the result of direct action on a single component of the 'price/pay' pairing, with the behaviour that is normal in a much less inflationary context working to bring about a simultaneous change in the second. Thus it is on prices that the government has decided to bear down' (Dumez and Jeunemaitre, 1989: 89).

However, while the prices policy was pursued for a long time and with considerable vigour, one of the reasons for its resilience was the repeated failure to establish an incomes policy.[15] The 1963 conference on earnings had drawn up the instruments for such a policy. However, it led to no concrete outcome: the proposal that a central body should be set up with responsibility for laying down norms compatible with price stability was dismissed almost immediately following a second report on the conditions under which such a body might be set up. This report was rejected because its conclusions were not acceptable to the person who had commissioned it, the Prime Minister, Georges Pompidou.[16] Even though these initiatives did not have the effect those taking them had hoped for, it is important to point out that it was the same individuals who, 13 and 20 years later were to put in place the policy they had actively worked for in 1963–64. In 1976, the person in question was the Prime Minister Raymond Barre[17] and in 1982 it was Jacques Delors, then Minister of Finance.[18] The failure to introduce an incomes policy was due not only to strong and partisan advocacy of the prices doctrine but also to elements of social and political resistance of which the government was well aware. Following a meeting held in 1971 between Pierre Massé, head of the French economic planning commission,[19] Jacques Delors, special adviser ('Chargé de mission') to Jacques Chaban-Delmas, the Prime Minister of the day, and the Minister of Finance, Valery Giscard d'Estaing, the last-named concluded (Dumez and Jeunemaitre, 1989: 89):

> An incomes policy cannot be introduced until after the catastrophes have become evident. … The French experience proves categorically that this [taking action before a catastrophe] is currently not possible. We must try gradually to modify the traditional underlying behaviour and get closer to an incomes policy before such a policy becomes necessary once the general disorderliness of earnings and prices has become evident. The approach to be adopted is an educational one similar to that described by Pierre Massé and Jacques Delors and to which I also subscribe.

Without sketching in the background in this way, it would be difficult to assess the extent of the transformation that got under way in 1982 and which was to lead to the emergence of a new

model of the formation of wage levels[20] and of their evolution. Despite the serious handicaps mentioned above, how was this transformation actually put into effect? The first step was to destroy the existing reference points.

The destruction of the existing reference points

The price and wage freeze was both a technical response to an emergency situation ('ending up in thrall to the IMF') and an arrangement put in place in order to produce a massive psychological shock. First, it was deliberately imposed for what, in the eyes of the French people and of certain politicians, was a relatively long period of three months: until the last moment, doubts persisted within the government as to the appropriateness of a three-month freeze. Delors openly advocated the same relatively non-interventionist policies as in 1963. He proposed a freeze on prices for a period of two weeks only; this short freeze should be accompanied, Delors suggested, by pay negotiations with the trade unions. Mauroy, then prime minister, was in favour of a three-month freeze on prices *and* wages, and it was his views that prevailed and, ironically, informed what came to be known as the 'Delors Plan'. Secondly, it was the first simultaneous price and wage freeze since the law of 11 February 1950 (Dumez and Jeunemaitre, 1989: 98–9). Finally, the freeze was implemented with some degree of rigour, at least as far as prices were concerned, which were under the control of the pernickety civil servants of the General Department of Competition and Consumption (DGCC).

In retrospect, we might wonder whether the credibility of future policy, which the price and wage freeze was intended to establish, cannot be explained, in part at least, by a radical change of rhetoric. The government was no longer intoning the dread mantra of 'incomes policy', whose repeated failures were still too fresh in the collective memory. Moreover, the price and wage freeze could not, without provocation, be presented as part of an income policy. It might not have been of any real benefit in the establishment of a credible policy, but at least a serious blunder was avoided.

The second strategy that led to the disappearance of the established reference points was put in place as soon as the freeze was lifted, and involved a change in the rules for calculating the

evolution of pay. Henceforth, the calculation was to be made by reference to the total wage bill (that is, in terms of averages) rather than by reference to individual wage levels or salary point (that is, in terms of levels). Let us outline these two rules, which are based on different lines of argument.

In the latter case, a wage is compared at two different dates; the rise in the level of pay reflects the successive increases over the period in question but does not take account of the dates at which the increases came into effect. In the former case, the calculation is based on the average wage in year n+1, which is compared to the average wage in year n. Consequently, the impact of a wage increase on the average wage in years n and n+1 depends on the date on which it comes into effect. Thus a pay rise agreed at the beginning of a year has a significant effect on the average wage in the current year but little effect in the following year. In this case, the 'carry-over effect' is said to be weak. Conversely, a rise put into effect at the end of a year has a weak effect on the average wage in the current year but a significant effect on the average wage in the following year: the 'carry-over effect' is strong. Since this rule is less simple to apply than the other one, it sometimes leads to counterintuitive outcomes and to sophisms of the following kind: 'You will not be getting a rise this year, but your salary will be going up by 4.4 per cent.' As a result, the evolution of pay acquires a certain degree of opacity, although that opacity is not due solely to the complexity of the rule (Faugère, 1988: 66–8).

The introduction of a different rule for calculating the evolution of pay also played a part in the destruction of the existing reference points. Diagnoses based on the evolution of wages were suddenly put into perspective by an administrative decision. When the annual wage increase is put into effect in several stages (the most frequent scenario in inflationary times), the result does indeed depend on the method of calculation adopted.

It was several years before pay negotiators (including employers) found their bearings in the new environment. In the meantime, the aim of destroying the existence reference points had been achieved. The state could now embark on the task of putting in place the necessary economic policy instruments, of mapping out the bounds of the possible.

Rules as instruments of disindexation

The difficulty of wage disindexation stems from the fact that the interpretative dimension of the rules must be compatible with the need to make the rules operational. We will argue that this can be achieved with rules that use thresholds as reference points. Indeed, it would seem, in order for the rules to be practicable, that they have to give individuals at least the illusion that they still enjoy some room for manoeuvre. If this is so, they may perhaps believe that the declared objective can be achieved.

Laying down the 'interpretative rules' for lifting the wages and prices freeze

The law of 30 June 1982 on the freezing of prices and wages was not a rule but a collective decision. Indeed, the legislation was not abstract in nature; rather, it took actual events into consideration, in this case 'the evolution of the international economic situation in recent months', and directly imposed the consequence drawn from those events, namely a wage freeze. The decision was categorical. It decreed that an event should take place, without laying down the framework within which future events were to be governed. Finally, the legislation was not permanent, since it was in force from 1 July to 30 October 1982.

In a circular of August 1982, the government laid down the new principles of wage formation that were to be applied when the prices and wages freeze was lifted: 'negotiators will have to be guided in their bargaining by mechanisms allowing for wage increases in predetermined steps with an adjustment at the end of the bargaining period and not by indexation mechanisms, which tend to consolidate the effects of inflation' (Faugère, 1988: 101).

This declaration could be considered as a rule, by virtue of the distance between the declaration and the solution, a gap that was all the more visible since the rule also contained within it three other rules: draw up a timetable for wage increases at the beginning of the bargaining period (R1); make an adjustment at the end of the bargaining period, after having compared wages, depending on whether they are indexed to past or forecast prices (R2); do not refer to past prices (R3).

Analysis of these three rules indicates that the decree of 1982 was an interpretative rule. It marked out an interpretative zone, which

we define as follows. The interpretative zone, within which the range of possibilities is located, is designated by a prototype, a model that is assumed to be a focal point or sometimes a standard, in the legal sense.[21] Indeed, R1 did not provide any criteria for establishing the timetable for wage rises (amounts and dates). R2 did not explain how the 'adjustment' in question should be effected. R3, which was formulated negatively, simply stated how the evolution of pay should no longer be calculated!

The imprecision of these rules was sufficient to create a state of considerable perplexity. By making rates defined *ex ante* the point of reference, wage increases were determined in advance. However, while the future might have been fixed in this way, it was subject to revision, since the decree made provision for an adjustment procedure known as the 'safeguard clause'. From a symbolic point of view, it was a mechanism essential to the task of mapping out the bounds of the possible. Indeed, this clause indicated, in the literal sense of the term, that the possible, even if it proved to be out of reach (which already verges on paradox), still remained possible. A clause was there to 'save' or restore the situation and to maintain the credibility of R1 in the following year. In reality, the symbolic management of pay was in no way sufficient, since employees were obviously alive to the various interpretations to which this clause gave rise.

The creation of a rule incorporating an upper limit

In order to apply an interpretative rule, three operations are necessary. First, the sphere of the possible delineated by the rule has to be marked out. In the case of R2, the nature of the adjustment has to be characterized; it may, for example, be slow or quick, general or particular, and so on. Let us assume that the notion of adjustment speed has been adopted. Criteria have to be found that reflect the various interpretations of this notion. Finally, one of these criteria has to be selected from the set of criteria thus constructed. At the end of this phase, the interpretative rule is transformed into a more operational rule, which often takes the form of a rule without thresholds. Under these conditions, the decree of September 1982 could not be applied unless an authority defined a rule incorporating thresholds or, in their absence, criteria enabling such thresholds

to be constructed. A letter from the Ministry of Labour (September 1982) did precisely that:

– the maximum inflation rate was fixed at 18 per cent (10 per cent for 1982 and 8 per cent for 1983);
– the forecast rate of inflation for this two-year period (18 per cent) was to be the reference rate for pay negotiations;
– the yardstick for the maintenance of purchasing power was to be the average wage, without any further details being given. All that was known was that a possible catching-up exercise was planned for late 1983.

Among the uncertainties that remained, some were dispelled (in part at least) by a wage agreement covering the public service that was concluded a month later. The reference point for this agreement was the evolution of the total wage bill (annual average) (Faugère, 1988: 102): 'when the December 1983 index is known, the parties will meet to discuss how the pay adjustment required to maintain purchasing power is to be implemented, depending on the economic situation and prospects'.

The economic policy norm had changed, in terms both of content and target. The aim was no longer to ensure that the purchasing power of all employees would increase but simply that it would be maintained and, moreover, for an abstract population, namely the average employee.[22] Nothing stood in the way of private-sector companies wishing to adopt this model – indeed the opposite was the case.

Why, in pursuing its disindexation policy, did the government adopt a rule incorporating an explicit threshold? In order to understand the government's thinking, we need to bear in mind the notion that bargaining is like a game in which, if one player wins, the other inevitably loses. However, in order for negotiations to succeed and agreements to be lasting, there must not be any losers. This fundamental principle has the air of a paradox, therefore, which is what makes it so difficult to apply. There is no shortage of metaphors to describe this situation: negotiations are said to be 'bogged down', 'at a standstill', and so on. Economic policy decision-makers must share some of the responsibility, since it falls to them to find the 'constitutive rules' for a game in which the

losers do not appear to have lost (Searle, 1969).[23] The first step is to create conditions that enable the actors to negotiate until they reach agreement. Thus the rule incorporating thresholds was the result of a deliberate strategy rather than the consequence of some imperfection in the economic forecasts that prevented the rule being specified precisely rather than in terms of an interval. In announcing a maximum inflation rate and not a single rate, therefore, the government seemed to have placed pay bargainers in a position to pursue the negotiations to a successful conclusion.

Thus the methods of wage disindexation were being clarified. By announcing a maximum inflation rate rather than a single rate, the government was making two changes of fundamental importance to the bargaining process. First, it was introducing into the collective consciousness the idea that the rate lay within an interval, which conveyed the impression that it was not certain. In this way, the actors could be led into negotiating not a single wage rate but rather a range. Secondly, the hypothesis that the inflation rate lay within an interval led them to believe that the endpoints were subjective estimates and therefore susceptible of revision. Such endpoints are representations of critical thresholds. We concur with Lordon's position on this (1995: 9): 'Far from having the naturalness of physical constraints, these "limits" are often invested with collectively constructed beliefs and representations.' For his part, Aglietta emphasizes the non-existence of an objective sphere of viability in economic policy (1995: 18): 'Attempts to maintain the economy within a sphere of viability would create a situation of dynamic instability if the thresholds could be pinpointed. However, this is not at all the case. The thresholds depend on agents' belief in the validity of the rules through which the monetary norm is put into effect.'

The functioning of rules within an interval

The pay bargaining model

These estimates of the critical thresholds give only the merest suggestion of how a rule functions within an interval. Thus a simplified pay bargaining model comprising three actors is proposed: the government (G), workers' representatives (W) and employers' representatives (E). This model is based on various types of interlocking intervals: while they share a common base – the inflation rate

announced by G – they evolve in line with the specific dynamic of the bargaining process. Let us explain.

G cannot forecast the rate of inflation without having constructed its own representation of the Viability Interval (VI) of economic activity, which is never revealed. The VI equates to the model of the economy. On the basis of the rate announced by G, each of the actors W and E constructs two representations, one relating to the viability interval imputed to G, the other to his own estimate of the viability interval. The respective position of the viability intervals depends on each actor's judgement of the rate announced by G, that is whether it is perceived as an underestimate, an overestimate or an accurate estimate. The bargaining gets under way on the basis of the revealed intervals (RI), which equate to a range of wage rates proposed by each actor W and E. In our model, the VI and the RI do not necessarily coincide: for reasons linked to bargaining strategy, only part of the VI is used in the formation of the RI.

We advance the hypothesis (H_1) that each actor's RI may not include the wage rate that he is actually seeking to obtain (or to pay); consequently, each actor's RI does not always express his judgement of G's rate. Considerations of bargaining strategy lie behind this hypothesis: if matters were otherwise, the actors' intentions would be uncovered too quickly.

Hypothesis H_2 concerns the actors' belief about the government's role: each of them is *certain* that G favours the other, which implies that G's rate is never regarded as fair. The expression 'favours the other' is not more precise because none of the actors knows the extent to which G favours the other. In E's case, this means that he thinks that G cannot have announced a rate that is unfavourable to W, that is an underestimated rate. The opposite applies in W's case: he thinks that G cannot have announced a rate that is unfavourable to E that is an overestimated rate. This hypothesis certainly explains the limited room for manoeuvre the Socialist government enjoyed as it sought to pursue an austerity policy while at the same time avoiding industrial disputes.

We advance the hypothesis (H_3) that the actors' opinions of G are capable of revision as long as the RIs are disconnected. This hypothesis is compatible with the logjams encountered during the actual bargaining process as soon as we take into consideration the fact that a rate is always agreed eventually. In the light of H_2, the revi-

sion involves propositions such as 'G is not as favourable to W as I thought'.

We advance the hypothesis (H_4) that, in order to propose a new RI, each actor takes account in his reasoning of the opinion of G's rate he imputes to the other and to which he has access through the interval revealed by the other. In a situation of uncertainty as to the real value of the anticipated inflation rate, it is natural to advance this hypothesis.

How are the Interval Revealed by the Employer (known henceforth as ERI) and the Interval Revealed by the Worker (hereinafter known as WRI) constructed? We maintain that the interval revealed by one is based on the indeterminacy of the interval revealed by the other. Let us assume that E and W reveal their preferences in turn. The first to propose an interval has to base his proposal on his own opinion of G's rate and hence on his estimate of the VI. On the other hand, the second one is able to draw on the information contained in the interval revealed by the first, which leads him to revise his judgement of G's rate. In our model, the bargaining continues until the two RIs intersect. However, the existence of an intersection merely indicates a convergence of interests. In order to obtain a lasting agreement, another condition is necessary: a wage rate is practicable if the intersection of the revealed intervals is an indeterminacy space, the definition of which is outlined below.

The mutual indeterminacy of the revealed internals, or the dynamics of negotiation

A proposition p is indeterminate if it has two possible interpretations A and B that are contradictory. More precisely, and in formal terms, the indeterminacy of p is characterized by an interpretation A, which is justified by arguments A', and an interpretation B, that is justified by arguments B'. Interpretations A and B and arguments A' and B' are obviously contradictory or at least have contradictory implications. The conclusions reached or premises adopted by one of the actors may serve as justifications for the other. An indeterminacy interval comprises all the indeterminate propositions.

Let us begin with the case in which E is the first to put forward an RI. Let e be the proposal [7, 10] made by the employers in the

knowledge that G has announced an anticipated inflation rate of 10 per cent.[24] Let us further specify that the proposal e has two contradictory interpretations:

– an interpretation A : E is seeking to reduce his wage bill; argument A′: in E's view, G's rate is *almost* correct;[25]
– an interpretation B : E merely wants to guarantee that purchasing power is maintained; argument B′: in E's view, G's rate is overestimated (inflation should be below 10 per cent).

Depending on the context, W is going to choose between one of the following two solutions:

(a) W adopts argument B′, which he uses as the premise for the opposite conclusion. W says to himself: 'if E thinks that G's rate is overestimated, and since G favours E, G's rate does not favour E as much as I thought'. W then proposes [12, 14].
(b) W adopts argument A′. W says to himself: 'if E thinks that G's rate is almost correct, and since G favours E, G's rate is an underestimate'. W then proposes [10, 12].

Consequently, the indeterminacy of proposal e, [7, 10[, made by the employers is the basis for both the intervals the workers' representatives might reveal.

Let us examine the case in which W is the first to propose an RI. The reasoning is the same and leads to the symmetrical conclusion. Let s be the proposal [12, 14], bearing in mind that G's anticipated inflation rate remains the same. Proposal s has two conflicting interpretations:

– an interpretation A: W does not want to lose purchasing power. Argument A′: according to W, G's anticipated inflation rate is an underestimate; it ought to be greater than 10 per cent;
– an interpretation B: W wants to gain purchasing power. Argument B′: according to W, G's rate is almost correct.

What is E going to do in these circumstances? He reasons that there are two logically possible solutions: (a) or (b). It should not be forgotten that E certainly has an opinion of G's rate but that it is

immediately revised in the light of the information revealed by W (by virtue of H_3):

(a) E adopts argument B', which he uses as a premise for the opposite conclusion. E says to himself: If W thinks that G's rate is almost correct, and since G favours W (G cannot have announced an underestimated rate), then G's rate is an overestimate (inflation could be less than 10 per cent)'. Thus E proposes [7, 10[.
(b) E adopts argument A'. E says to himself: 'If W thinks that G's rate is an overestimate, and since G favours W, G's rate is either an overestimate or almost correct.' E proposes an interval compatible with both his conclusions, namely [8, 10].

Consequently, the indeterminacy of proposal s, the interval [12, 14], is the basis for the construction of the two intervals that the employer is able to reveal.

None of the configurations described gives rise to an overlapping interval. Can theoretical arguments be advanced to explain why bargaining continues? We maintain that this happens because the successive WRIs and ERIs are constructed on the basis of the mutual indeterminacy of the revealed intervals. It is the indeterminacy of the RIs that turns the bargaining into a dynamic process.

Let us assume that E adopts argument A' and proposes [8, 10]. How do the negotiations proceed? It is W's turn to make a counterproposal. S has two possible interpretations of this interval:

– an interpretation C : E thinks that G's rate is an overestimate. Argument C': the upper endpoint of the interval is 10;
– an interpretation D: E thinks that G's rate is correct. Argument D': the interval is closed.

(a) Let us break down the reasoning involved if W chooses interpretation C. 'E thinks that G's rate is an overestimate, but I am certain that G favours E (G cannot have announced an overestimated rate), so E is mistaken.' However, this conclusion does not satisfy W and introduces some degree of doubt as to his own opinion of G's rate, which he regarded as an underestimate. This well-known phenomenon of cognitive dissonance

(Festinger, 1957) leads W to conclude that G's rate is either less of an underestimate than he thought[26] or almost correct. Being unable to choose between the two conclusions, W proposes an interval compatible with them both, namely [10, 12]. By a process endogenous to the model, W has revised his judgement of G's rate, which leads to an agreement on 10 per cent.

(b) If W adopts interpretation D, he says to himself: 'E thinks that G's rate is almost correct, and since G, who favours E, cannot have announced an overestimated rate, perhaps I'm mistaken about G's rate, which I thought was an overestimate.' This cognitive dissonance leads W to revise his own view of G's rate; he now believes that G's rate is less of an underestimate than he thought at the outset. W revises his interval downwards and proposes [9, 11]. The overlapping interval is [9, 10], which makes it possible to reach complete agreement on this interval.

Such is our reconstitution of the procedures that made disindexation possible. While the public sector helped to make them credible by adhering to the anticipated price norms (Daniel, 1992), it remains to be explained why disindexation continued, to the point where it became an important element in the new economic policy regime.

The indeterminacy of the wage rate

In order for disindexation to be lasting, the wage rate that is negotiated and agreed has to be situated within an indeterminacy space. This space is constituted by the ideas W and E have formed of the Government's Non-Revealed Interval (GNRI). Thus there are two GNRIs.

Each of the actors W and E has, of course, decided in his own heart of hearts in favour of one or other of the two interpretations: the negotiated rate is or is not in his favour. In public, however, W and E declare the situation to be indeterminate, in such a way as to show that their interests always command respect. This is why the indeterminacy is described as 'situated'. Each party demonstrates to the other that the wage rate decided on is compatible not only with his own interests but also with those of the other party.

The wage increase is the object of two interpretations that are presented publicly as contradictory: 1. the rate is below the upper limit,

which leads W to say that it is the result of pressure from E, who has used external economic constraints as a pretext for reducing wage rates; 2. the rate is above the lower limit, which causes E to say that it is the result of pressure from W, who is indifferent to economic constraints and has a preference for defending the interests of insiders over those of outsiders. If these two interpretations are simultaneously credible, and remain so, we will call the negotiated wage rate the 'point of convention', in order to emphasize the stability of the agreement.

The fact that, in reality, pay negotiations deal with other aspects of employment and working conditions than just wages alone (working time, reductions in staffing levels, etc.) increases the stability of the point of concurrence. The multidimensional nature of the negotiations provides both W and E with opportunities to show that there are no losers. At the beginning of the negotiations, W and E know that, in any given dimension of the negotiations, they will be able to obtain more, and less in another dimension. This is why they can accept a certain wage rate, even at the price of a loss in another dimension of the negotiations, because they judge this loss to be necessary if they are to gain in the other dimension. It could be concluded from this that the two dimensions are not independent. In fact, the economic aspect of the correlation between the various dimensions has to be distinguished from their dependence in terms of representations. In the case of an economic dependency between the various dimensions, the party that locates the point of convention in the new dimension incorporated into the agreement can be adjudged to be the winner. In the case of a representational dependency between the various dimensions, on the other hand, the notion of indeterminacy makes it possible to maintain the independence of the various dimensions. After all, a reduction in one parameter and an increase in another can have several possible interpretations: one will emphasize that the reduction is a loss while in another the increase will be perceived as a gain. In other words, one of the challenges facing each party in the bargaining process is to present their result in such a way as to convey the impression that it is impossible to ascertain whether a gain in one dimension benefits one actor more than his loss in another dimension benefits the other.

Conclusion

We have reached three main conclusions. First, if a new rule is to be successfully implemented, not only does it have to be based on institutions that make the rule credible but also some of the previous rules have to be neutralized or destroyed. In the particular case of wage disindexation in France, there had to be a break with the model of price–wage loop management that had been put in place in 1950. We have shown that the simultaneous freezing of prices and wages and the change in the method of calculating the evolution of pay were mechanisms that played a decisive part in the destruction of the existing reference points. A practicable economic policy must be based on rules that give individuals, if not any real degree of freedom, then at least the illusion that still enjoy some room for manoeuvre. Hence the second conclusion, which is that the rules must be defined with reference to thresholds, since they make it possible to link the 'interpretative' dimension and the need to make the rules operational. This is the value of announcing an anticipated maximum rate of inflation rather than a fixed and certain rate. These thresholds reflect different representations of the economy. The third conclusion is that the procedures whereby disindexation was implemented can be reconstructed by drawing on the notions of indeterminacy space and virtual and revealed intervals in order to model the operation of the rules. In concrete terms, the diversity of rules governing the evolution of pay that has been observed since the end of the 1980s (Reynaud, 1992; Reynaud and Najman, 1992; Beffa *et al.*, 1999) would seem to suggest that this type of model has been practicable and capable of producing a variety of different solutions depending on size of firm, sector and industrial relations style.

3

The Introduction of a Wage Bonus in a Workshop of the Paris Métro

This chapter investigates the introduction of a new rule, not at a general level, as in the case of wage disindexation in France in the 1980s, but at a microeconomic level in the Atelier de Maintenance des Equipements Electroniques (AME[1]) of the Paris Métro. It focuses in particular on the strategies deployed by management as they sought to gain acceptance for a wage rule that aimed to increase labour productivity. The general principles underpinning this rule were laid down beforehand by the managing director of the Régie Autonome des Transports Parisiens (RATP) (the Parisian Transport Company) and the management of the Rail Rolling Stock Department (in French, Matériel Roulant Ferroviaire MRF[2]), whose 3000 or so employees were all to be subject to the new rule.

This case is very interesting, for at least two reasons. First, it can be used to analyse the entire development of a rule, from its most general expression to its implementation on the ground. In this instance, since the MRF and the general management of the Métro were able to formulate general principles only, it fell to the operational units to define and negotiate the conditions under which these principles were to be applied.

Secondly, I observed the development of the new pay rule and its implications over a lengthy period, from its introduction in July/August 1992 until June 2001. Shortly after its introduction, between February and April 1993, I conducted some 35 interviews with operatives, supervisors, shop stewards and management. As far as possible, the interviews with the operatives were held at their workstations, which enabled me to gain a better understanding of the

actual work situations. I also had at my disposal a number of documents made available to me by management that enabled me to study how the rule had been produced. In November and December 1994, I returned to the maintenance workshop with an ergonomist from the National Agency for the Improvement of Working Conditions (ANACT) in order to investigate the effects of the new pay rule on the team dynamics a little less than two years after my first interviews.[3] Having obtained the agreement of management, unions and operatives on the objectives and method of the study, we set to work not by interviewing employees but by observing operatives at work. By agreement with management, we observed three teams, each working with a different technology (control electronics, power electronics and micromechanics). In a brief period of immersion in each team's activities, during which our working day extended over the longest time slot worked by the operatives, we observed them at work and questioned them about what they were doing, how and why, in what order, etc. Our attention was concentrated on the nature of the cooperation between the operatives, on the methods of task selection and on the strategies adopted in order to secure the maximum bonus. The reports and our observations were subsequently shown to the operatives and validated by them and then handed to management. Finally, between September 2000 and June 2001, I returned to the workshop with the aim of analysing the consequences of the pay rule for labour productivity. I expended considerable time and effort on reconstituting monthly statistical series on each team's productivity and work quality between November 1992 and December 2000. While I was engaged in this task, I conducted numerous interviews with the director of AME.[4]

The object of investigation in this chapter is the process of translating an interpretative rule into an operational rule, and the degree of credibility accompanying that process. What our study reveals is a model of rule formation based on 'lock-in' strategies, the main feature of which is the use of intermediate rules whose margin for interpretation shifts as the negotiations advance and the final rule is imposed.

An interpretative rule

In December 1991, the Rail Rolling Stock management and all the trade unions, with the exception of the Confédération Générale des

Travailleurs (CGT), signed a 'Trial Agreement on a Team Efficiency Improvement Scheme' (known in French as the DEC Agreement, after its French name: 'Convention d'Expérimentation de la Démarche d'Efficacité Collective'). This agreement laid down the general principles governing the pay rule.

The DEC was not introduced into the workshop in order to resolve a serious labour productivity problem. In 1990, indeed, the workshop was on an upward trajectory in terms of productivity and efficiency compared with other MRF units. In terms of openness and ability to change, the workshop is one of the few units to maintain external contacts, working with suppliers Alstom and Matra. This openness to the outside world is one of the workshop's assets.

At the time the new rule was introduced, the workshop had 118 operatives[5] divided into seven teams. Five teams were engaged in the repair and maintenance of Métro lines, particularly the electronics but also micromechanics and relays, while the other two were the logistics team and the system tests design and production team (cf. Annex A-1: The AME teams in 1992).

The production targets laid down in the DEC Agreement increased work intensity by reducing the difference between statutory and actual working times. The explicit objective was to improve team '*efficiency*' by 'producing output of a good level in terms of both quantity and quality' (cf. Annex A-2: The DEC Agreement). The team productivity bonus was to be paid in proportion to each team's collective results up to a certain threshold and at a flat rate above that level; it was to be shared equally among team members and to be paid every six months. The team contracts, concluded between the supervisor responsible for the team and management, committed operatives for periods of three years and could be renewed.

Finally, the bonus was to be paid only to those operatives who volunteered to participate in the scheme. It is important to note that voluntary participation is a way of short-circuiting collective bargaining within the workshop itself.

The rule and its context: the decentralization of the RATP and the strike of 1988

The introduction of the DEC must first be located within the RATP's general policy. In 1989, the authority embarked upon a process of

decentralization. The aim of the then chairman, Christian Blanc, was to modernize the authority and to put it at the service of travellers; in short, decentralization was intended to transform the workings of the RATP, replacing what was still largely a bureaucratic culture with an enterprise culture. The director of AME restated this objective in the following terms in the presence of the chairman: 'What we need to do is to shed our image as a money-spending department and be seen instead as a company providing a service for a customer.'[6] The main mechanisms by which decentralization was to be achieved were the following: 1. shortening of the chain of command from seven to three levels[7] in order to hasten the transmission of information and facilitate coordination; and 2. delegation of responsibilities through the contractualization of objectives between each level of management in such a way as to increase workforce autonomy and motivation and to accelerate decision-making.

The DEC fell within the scope of this thoroughgoing reform of the RATP, since it fell to the directors of the various departments and units to initiate its implementation. Furthermore, a document drawn up in 1992 by the director of MRF for the new chairman, Francis Lorentz, testified to the close link between the DEC and decentralization:

> Quite apart from the decentralization process, which is in itself a means of motivating men and women through the setting of objectives, the devolvement of decision-making powers and contractualization, motivation must be fostered in other ways as well. The development of the team efficiency improvement scheme will enable us, through consultation between manual workers and their supervisors, to conclude production agreements based on adherence to quantitative and qualitative indicators. This mode of work organization should allow us to raise the status of the workforce while at the same time achieving the highest level of economic efficiency. In particular, the scheme will enable manual workers in the department to make even better use of their skills, thereby increasing their efficiency and effectiveness.[8]

In 1988, the RATP had just been through a period of industrial unrest, with a strike lasting about a month in the MRF department, and particularly in the AME, which had finished by paralysing the Métro. The dispute was in essence a protest by maintenance workers

against the seemingly much more favourable conditions enjoyed by operatives (drivers and mechanics), including a lower retirement age and higher pay. The reason for the pay differential lay less in the bonuses paid to operatives in recognition of their difficult working conditions than in a specific mode of labour management applied to operatives, whose potential for taking strike action the RATP had always feared. From this perspective, the DEC Agreement, while it was undoubtedly part of the authority's modernization project, can also be seen as one of the instruments deployed to reduce the pay gap between train crews and other workers while at the same time providing an acceptable justification for it, one that would not trigger a similar demand on the part of operatives.

The DEC and the scope for interpretation

The principles laid down in the DEC Agreement contain several 'interpretative rules', which are readily identifiable by their use of a standard, in the legal sense of the term. The definition of a standard is a particular technique used in rule formulation that is, *a priori*, indeterminate.[9] Two examples are particularly interesting. One is the fixing of the thresholds for the work volume indicator, which has recourse to the notion of 'normality': 'The lower limit is set by indicators equating to the average *normal activity* of a manual worker in the department (work on the basis of time allowed or approved times.'[10] In fact, of course, the addition of the qualification *average* to the term *normal activity* does not resolve the problem of interpretation. In order to obtain an average, evaluation tools are required whose reference point is also *normal activity*. The only way of cutting through this circular argument is to enter into negotiations with a view to reaching a consensus on the evaluation of normal activity. The second example is the rule for revising the thresholds: 'Should the RATP make a *significant change* to work methods, to task organization or to equipment, the reference values for the indicators will be reviewed as a result.'[11] When can a change be said to be 'significant'?

This recourse to standards is necessary because rules cannot make provision for all eventualities. Standards bring into play certain basic values, such as normality, morality, loyalty and rationality, or qualifiers such as evident, satisfactory, serious, good faith, diligence, exceptional circumstances, opportunity, and so on. Implementation of a standard is not governed by any automatic mechanism. In

theory, the signatories to an agreement should agree on the interpretation to be given to the standards before they sign the agreement. This did not happen in the AME.

In concrete terms, the MRF management came to the view that *normal work* was to be defined in terms of a *reference time* of 5.42 hours per day, 'at a work rate of 100',[12] which equated to the established norm for times allowed. The calculation was performed as follows: statutory working time for each worker was 7.6 hours per day, or 38 hours per week. Various other times had to be deducted from this weekly working time, including the time required for changing clothes, taking a shower, weekly cleaning of work stations, statutory absences and so on. This produced a daily working time of 6.5 hours, from which recovery time and the time allowance for arduous working conditions (19.9 per cent) had to be deducted, giving a reference time of 5.42 hours. This tallied with the DEC: the second threshold linked to the work volume indicator was to be located 20 per cent above the first threshold.

This explains why the team contracts took these two thresholds as a starting point. The maximum bonus was to be paid when the team achieved an output equivalent to a working time of 6.5 hours; no bonus would be due when team output equated to a working time of 5.42 hours. Within these two thresholds, it was to be paid pro rata (cf. Annex A-3: The minimum and maximum DEC ratios).

Transforming an interpretative rule into a 'ready-to-use rule'

The DEC Agreement stipulated that the new rule should be adapted by the individual units in order to make it operational. In this section, we analyse the interpretative processes to which the agreement gave rise in the AME, one stage in which was the signing of team contracts with strictly productivist objectives. In the course of this process, the interpretative rule was transformed into a 'ready-to-use rule' which, in strictly *formal* terms, left no possible room for interpretation (Reynaud, 1996). There were two important issues at stake in this process of interpretation: it was to determine the scale of any cuts in the workforce and whether or not work previously subcontracted was to be brought back in house.

From the DEC agreement to the prototype contract, or how one of the historically plausible paths became the reference

A prototype contract

The supervisors were, albeit reluctantly, the driving force behind the implementation of the DEC. One of them, who considered that 'the DEC was imposed', took the view that management would make the planned reductions in manning levels whether or not the DEC was put in place. As he explained: 'if there is a disagreement with the boss, something has to be done to move things on; since he's my boss, I side with him'. According to another supervisor, 'They didn't ask us for our opinion.' And indeed, the workshop management used the same model for drawing up all the team contracts. There are several possible explanations for this.[13] A member of the workshop's management team took the lead by drafting a prototype contract, which made the supervisors' task easier: having a draft contract to hand meant they were able 'to make sense of the whole process'.[14] All they had to do was to give their opinion of the relative weight of the quantitative and qualitative ratios in calculating the productivity bonus. For management, the drafting of a model contract saved time and was also a guarantee of success, since the contracts subsequently gained the support of the MRF human resources department. Once the first contract had been validated, it was easier and quicker to reach agreement on all the others. In this way, one of the historically plausible paths became the reference.

All the contracts contained quantitative (and qualitative) indicators equating to the minimum and maximum DEC ratios. The method of calculation was always the same.[15] The objective was to obtain the same output (calculated in terms of *Weighted Output Units* (WOUs)[16] with fewer operatives or, with the same number of operatives, to increase output. The minimum DEC ratio was defined as the output that would have been produced in 1991 if the time worked had been the minimum required. The maximum DEC ratio, on the other hand, was defined as the output that would have been produced if the time worked had been the maximum possible.

The paradox inherent in these contracts was that management was undertaking to pay a bonus in order to encourage operatives to

work a number of hours between 5.80[17] and the statutory daily working time of 6.50 hours. Indeed, this paradox surprised quite a few of the operatives themselves. 'They're giving us a bonus to work our normal hours', is the kind of remark that was made frequently during the interviews I conducted.

The application of the team contracts and the operatives' support for them

Each supervisor with responsibility for a team was required to obtain his operatives' support for the contract drawn up with management. Although the DEC Agreement stated that the scheme was based on *voluntary participation*, the AME management was eager to have all its teams operating under the same DEC regime. Otherwise, there would inevitably have been pay gaps and tensions between those who had signed up to the DEC and those who had not. Moreover, if only a minority of teams had signed up to the DEC contract, they would have been regarded as *traitors* by the others. Such a situation would have weakened the new work norm and undermined morale throughout the workshop.[18]

In order to facilitate the task of obtaining the operatives' support while at the same time adhering at least formally to the notion of voluntary participation, each supervisor had to obtain only an implicit agreement from the operatives in order to be able to sign the contract with management. All operatives hostile to the DEC had to declare their opposition by filling in a form, the so-called 'model 18'. Management's strategy seemed to be to assume that 'silence gives consent'.

In order to persuade the operatives, supervisors were obliged to mount an education campaign, outlining the immediate objective of the DEC (productivity), justifying the assessments of operatives' actual working time prior to the introduction of the DEC and, finally, explaining the meaning of the various ratios. In most of the teams, this phase lasted two to four months. The various contracts were actually signed within a very short period of time, the first one being concluded in July 1992 and the other four a month later. Of the 118 operatives, only one refused to sign up to the DEC contract in order not to be obliged to work more. Approximately 60 per cent of the other operatives were in favour of the DEC and 40 per cent

were initially opposed to it. They put forward the following arguments in support of their position:

– opposition to the principle of a bonus: 'my boss is not Stalin, and I'm not Stakhanov';
– opposition to the payment of a bonus which, by definition, is not part of the wage and is disregarded in the calculation of pension entitlements;
– the feeling that 'we were doing our work properly already';
– the fear of unemployment in the rest of the economy because of the increase in productivity gains (the CGT's argument);
– the inadequacy of the bonus relative to the effort required: 'improving productivity in order to earn 500 francs isn't worth the effort';
– the lack of transparency in the indicators.

However, the 40 per cent of operatives opposed to the DEC eventually accepted the contract; realizing that the DEC was inevitable, they preferred to toe the majority line. As one of them put it: 'it's always nice to take home an extra 500 francs a month'. Or, in the words of another: 'our supervisor asked for a show of hands in order to gauge our opinion of the DEC; I wasn't going to stop the others from getting the bonus, so I put my hand up too'. In order to justify their position, they explained that they had no choice in the matter. Some feigned ignorance of the famous 'model 18' (despite it being used routinely in the event of disputes or claims) and of the one operative who had filled in the form. Moscovici 1976 and Paichelier and Moscovici (1984: 141) describe this conformist or 'follow-my-leader' attitude:

> It is characterized by the public acceptance of a mode of behaviour or value system but without private approval. Ostensibly, individuals or groups submit in order to avoid unpleasantness: devaluation, rejection, repression. However, they retain their belief and are willing to change their behaviour as soon as circumstances allow. … This 'follow-my-leader' attitude conceals a private resistance, which in many cases has no explicit manifestation. It is, as it were, the pathetic strength of the weak.

The 'form investments' prior to the contracts

The five contracts concluded with the production teams were very precisely drafted. They required a prior process of codification and of harmonization between non-comparable products. Any possible reductions in manning levels also had to be calculated on the basis of snapshot observations,[19] while the volume of previously subcontracted work to be brought back in house had to be assessed for each team separately. In order to limit the opportunities for dispute, it was essential to use a so-called scientific method. The AME management decided to adopt the snapshot observation method.

Thus two exercises in 'form investment' (Eymard-Duvernay and Thévenot, 1983; Thévenot, 1986) played a strategic role in the drafting of the team contracts. These investments brought into play the notions of *WOUs* and of *approved time* and *approved activity level*. The term 'form investment' denotes the process of creating equivalence between non-comparable objects or units.

The construction of the WOUs

WOUs were developed as an instrument for creating equivalence between the various types of operations taking place in the AME. Repairing a relay does not require the same amount of time as repairing an electronic control unit, for example. Merely summing the number of operations performed by each team is meaningless. Moreover, the director of the AME did not want to use the notion of *times allowed*[20] that was used throughout the rest of the RATP because he believed it encouraged workers simply to adjust to them without doing any more. This explains why a physical output indicator, such as the WOUs, was selected as the basic reference unit. One of the problems with the WOUs was defining the activities that were to be accounted as WOUs and those were not to be thus accounted. This was a bone of contention constantly alluded to by operatives and supervisors. For this reason, each team was allocated an activity unit coefficient which, from 1993 onwards, was to be much more detailed and defined in terms of each team's *Basic Output Unit* (BOU); at this point, it became known as the 'weighting coefficient'.

Table 3.1 illustrates, for example, that an operation carried out by the micromechanics team takes four times as long as an operation carried out by teams EK1 and EK2, some of team EK3 and the relays

Table 3.1 Teams' activity unit coefficients in 1991[21]

Teams	*Activity unit coefficients or weighting coefficients*
EK1: control electronics	1
EK2: control electronics	1
EK3: power electronics	0.3
Relays	1
Micromechanics	4

Source: Electronic Equipment Maintenance Workshop (RATP).

team. These activity unit coefficients were the result of averages calculated using a database in which was recorded the history of the workshop's output since 1984, detailing all the operations carried out and the time taken for each of them. A detailed and continuous verification process was put in place in order to check the stability of the differences in times and hence the validity of the coefficient, even if the average time had changed. Use of the WOU meant that a single operating account could be put in place for the entire workshop, albeit at the price of a certain simplification whereby, taking account of the activity unit coefficient, one WOU was deemed equivalent to another, whether within a team or between teams.

The allocation to each team of a weighting coefficient based on management estimates (without any proper calculations) was considered both arbitrary and unjust, since even within the same team there are several types of operations that take different times to complete:

- since the BOUs are specific to each category of equipment and generation of technology, the time required for each operation differs from one BOU to another;
- breakdowns are not all equally difficult to repair: some of them are simple, others complex. As one supervisor said, the most difficult thing is to find a breakdown that does not exist;
- corrective maintenance operations, preventive maintenance operations and equipment modifications take very different lengths of time to complete. For example, the shortest corrective operation takes half an hour, while the preventive maintenance of some parts may require 13 hours' work;[22]

– some teams receive racks containing several electronic circuit boards to be repaired, as well as single boards. Now operations on an entire rack and those involving only a single board are both counted as a single BOU, or at least they were in 1991–92. How did such a situation, which has given rise to numerous disputes, come to be established?

The first reason is technical in nature. After carrying out its fault-finding operations, the traffic department sends in either all the boards in a set or, if the fault has been clearly identified, just a single board or relay. The second set of reasons has to do with organizational decisions made in the past, as certain supervisors sought to simplify the operatives' work. The operatives have to record the tasks they have completed every day on a computer (name and nature of the operation, time spent on it, etc.). In order to speed this task up, certain identical boards are put together in the same rack. This situation was not changed, because, according to management, 'we weren't going to go back on what was already being done' and, according to a supervisor, 'because we didn't want to change our practices'. In this case, the justification is based on reference to precedent.

The notions of approved time and approved activity level and the equivalence with times allowed

The director of the AME had set himself the target of a 12 per cent increase in productivity, rather than the 20 per cent advocated in the DEC Agreement. How could he justify a 12 per cent gain without appearing to infringe the 20 per cent rule laid down by the RATP's senior management? For the MRF as a whole, the time equating to the DEC minimum was fixed at 5.42 hours, at a work rate of 100.[23] The AME management, in agreement with that of the MRF, took the view that the arduousness coefficient of seven per cent was not applicable to the AME because of the nature of the work done there. Consequently, the DEC minimum time was set at 5.80 hours (5.42 hours x 1.07). It should be stressed that there was an almost perfect correspondence between this figure, provided by the MRF, and the weighted average of the findings of the snapshot observations of each AME team (5.82 hours). The arduousness coefficient had been introduced just when it was needed! The

maximum DEC time was set at 6.50 hours as stipulated in the DEC Agreement, which equated precisely to a 12 per cent productivity increase.

The notion of *approved time*, which exists only within the AME and was developed especially for the purpose, is the estimate of actual working time produced by this method. For each type of output, AME management drew up tables showing the correlations between the times allowed for each type of output and the approved times equating to the DEC minimum and maximum times. In this way, management was able, whenever required, to think in terms of time allowed, which was the only mode of measurement in force throughout the rest of the RATP. The development of this notion clearly constituted an exercise in 'form investment'.

The *approved activity level* was defined as 'the total output to be produced (number of WOUs/number of operatives) corresponding to a level of activity at least equal to that required for the times allowed'.[24]

The snapshot observation method played a very important role in determining the approved time and activity level. It was used to validate the approved times. The following section is devoted, therefore, to an outline of the principles and practice of snapshot observation.

The transformation of snapshot observations into an interpretative rule

The snapshot observation method, which is a rule to be applied strictly (that is, a ready-to-use rule), was indeed transformed into an interpretative rule, which in the end proved a positive development.

Like time studies, snapshot observations are a specific technique for measuring working time that follows strict procedures laid down by the Bureau des Temps Elémentaires (BTE), an agency of the International Labour Office in Geneva.

Compared with time studies, however, snapshot observations are more flexible and less likely to be opposed by workers. This is the reason why they were used in the AME. They are a means of measuring the relative shares of productive and unproductive time for a given activity. The procedure is as follows. A member of the production engineering department observes whether or not an operative is at his workstation. If he is not, the observer does not look for the reason and considers the operative to be not working. Thus to be

working means to be at one's workstation, even if it is necessary to move around the workshop in order to fetch a part or a tool or to seek a colleague's advice. Each time he passes by, the production engineer (or whoever is acting on his behalf) counts the number of operatives who are working and those who are not working. This process has to be repeated a sufficient number of times to be statistically significant (the distribution of working time within each team must obey a normal law). According to Lambrou (1964: 24), experience shows that approximately 100 measurements are needed in order 'to assess the more general elements', such as the percentage of actual working time, and about 500 in order to determine output indices, because of the law of large numbers. The production engineer has to select his observation times at random from a table of numbers. In order to prevent the operatives from discerning any pattern in the observations, the production engineer must also undertake false measurements. The snapshot observation technique does not require any assessment of 'work rate', nor of what constitutes 'a work rate of 100'. All these arrangements how that snapshot observations do not, in theory, require any interpretation on the part of the production engineer. We are certainly dealing here with a 'ready-to-use rule'.

This method was not applied unchanged but was subjected to interpretation. Two factors explain why the snapshot observations were, in practice, transformed into an interpretative rule.

First, there was no real training in the method – fortunately as it transpired – and hence no accreditation was issued. In practice, each supervisor went about the task as he saw fit; the director of the AME preferred not to get involved. As it turned out, the absence of any training made it possible to transform a method with indisputable results into a basis for negotiations between management and supervisors. Incidentally, the team in which the snapshot observations were carried out – 'in due form' – by one of the two supervisors who had been on a week's course at the BTE experienced considerable tensions.

Training in the method consisted at most of an attempt 'to raise awareness', as one of the two supervisors who had been on courses at the BTE put it. It is perfectly understandable, therefore, that the other supervisors, who had been trained on the job and by reading BTE documentation, should have developed different practices,

ranging from *glances* into the operatives' work area through the glass partition separating them, through 'guesstimates or deep-seated convictions'[25] of each operative's working time to observations carried out without such a strict method as that recommended by the BTE. According to the supervisors, the periods over which the snapshot observations were carried out varied between one and six months. The deviations from the method are very evident. Indeed, only one of the two supervisors who had been on a course at the BTE stated that he was not concerned with assessing work rate or determining what constituted a 'work rate of 100'. Some tried conscientiously to estimate the 'work rate of 100'. Others made no reference to it at all. Management, which conducted its own measurements, stated that snapshot observations of operatives functioning at a work rate of 100 had been conducted, as the summary tables in the internal memo show. Finally, the audit report compiled by the MRF Human Resources Department on 7 December 1992 drew attention to the fact that 'work rates should be analyzed with a greater degree of discrimination within the same team', and the author cites the example of one of the two teams whose supervisor had strictly followed the lessons he had learnt during the BTE course!

Secondly, the results of the snapshot observations carried out by the supervisors became the object of negotiations with management, which had conducted its own measurements. Management took the view that some observations had to be corrected, in order to 'eliminate supervisor subjectivity', to reduce team manning levels or redistribute work in ways that were 'socially acceptable' and in order to achieve 'a consensus among the supervisors and to involve their responsibility'.[26] In this connection, it should be emphasized that the search for productivity gains within the RATP does not generally lead to job losses. In order to avoid such losses, the director brought previously subcontracted work back in house.

In practice, management and supervisors ended up by ranking the teams in the same order in terms of the productivity gains to be achieved. As a result, the negotiations revolved around the extent of the (theoretical) reductions in manning levels and work allocation within the teams. This is the explanation for the fortunate convergence between the overall estimates produced by MRF (5.8 hours)

Table 3.2 Snapshot observations of one team

	Reference situation work rate of 100		*Potential gains relative to the DEC maximum (6.50 hours)*	
	Operatives	*Estimated time*	*In hours*	*In nos of operatives*
	3	6.50	0	
	7	6.25	1.75	
	5	5.50	5.00	
	8	4.75	14.00	
Current average	5.6		20.75 hours	∠3

Source: Electronic Equipment Maintenance Workshop (RATP).

and those produced by the AME (5.82 hours). Table 3.2 shows the results of the snapshot observations for one team after the negotiations and the results in terms of reductions in manning levels.

The snapshot observations, which in theory constitute a 'ready-to-use rule', had in practice to be transformed into an interpretative rule; because of the inadequacy of the training in this area offered to supervisors, this process seemed inevitable.

Conclusion

As this chapter has shown, a space can open up between the statement of a principle on which a rule is based and its implementation. Within this space, bargaining, strategies and power relations really have to be taken into consideration. Thus the DEC, which was initially conceived as a 'ready-to-use rule' that could be reduced to an algebraic formula, partially escaped its master's control. What emerged was not the 'simple formula' its advocates were seeking but a really huge complex system, a framework for the realization of productivity gains. As the case of the DEC shows, *the interpretation of the rules is indeed the product of their use*.

4
Following the Rules: Definition and Practical Implications

Our purpose in this chapter is to extend our practical understanding of the ways in which rules operate. Once again, we draw on the observations carried out over a period of several years in the AME of the Paris Métro as part of a study of the introduction of a new wage rule. It would be a mistake to analyse the effects of the new wage rule in isolation. What needs to be considered, rather, is the entire set of rules into which the new rule was incorporated. The main reason for this is that the rules governing an activity are incomplete; each of them needs to be interpreted in the light of information contained in other rules, as well as of custom and practice and context. It seems to us that one of the ways in which we can begin to understand how rules impact on individuals and groups is to turn the question round and examine how individuals follow rules. This is the purpose of the first part of this chapter. As we observed operatives at work, it became clear to us that they were translating these necessarily abstract rules into concrete reference points, the interpretation of which gradually crystallized and led to the repetitive working practices generally denoted by the term routine. In our view, one of the major differences between rules and routines is that the former are explicit mechanisms while the latter are implicit. In the course of our observations, routines emerged as one of the ways – but by no means the only one – in which rules are followed. It is logical, therefore, to ask in what respects the notion of routine we formulated in the course of our observations is linked to the notion of routine that has been widely adopted by evolutionary economists. The second part of the

chapter is given over to an examination of this question. This leads, in the third part, to an outline of our concept of the links between rules and routines, that is of the role of routines in managing the incompleteness of rules. Routines emerge as a means of stabilizing the interpretation of rules.

The incompleteness and plurality of rules

In the year 2000, the 122 operatives employed in AME[1] were distributed among eight teams, five of which were responsible for maintenance of the electronic circuit boards, power electronics, micromechanical equipment and relays in critical failure mode used on the various Metro lines (cf. Annex B–1: The levels of maintenance levels in the AME). Thus what distinguishes the teams from each other is the different electronic applications they deal with. The teams are themselves divided into 'basic production units' (BPUs) according to the generation of equipment they repair. The first generation consists of discrete components in electronic installations carrying out simple functions and is found in the rubber-tyred rolling stock (MP 55), which came into service in 1956, and MP 59 stock, first introduced in May 1963. The second generation makes use of integrated circuits and is installed in analogic control systems on steel-wheeled rolling stock MF 67 and MF 77) and on the 1979 MI 79 interurban stock. The third generation, the MI 84, is made up of micro-controller controlled systems (RATP, 2000). The various teams operate independently. In all, 604 trains are maintained in the workshop, making a total of 325 000 electronic circuit boards, of which there are 500 different models, 95 000 electronic power components, 370 000 relays and 2500 items of micromechanical equipment.

All the operatives in the same BPU work in the same space, which they sometimes share with another BPU. In the case of electronic equipment, which is not subject to wear and tear, the work is individual and involves the repair of faulty sub-units. These are so-called corrective procedures, also known as *reparative services*[2] (involving the repair of equipment removed by the line operators[3]); microemechanical equipment and relays, which are subject to wear and tear, are the object not only of corrective procedures but also of preventive maintenance operations. *Major services* and *standard services* are

scheduled on the basis of the number of kilometres travelled. However, the engineering and design department can ask for technical modifications to the circuit boards, which are carried out in addition to the *major services*. The train maintenance workshops may lodge a *complaint* about the quality of a repair and request that the reliability of a repaired part be improved, for all future corrective procedures. A reliability enhancement procedure of this kind is known as *reconditioning*.

Before examining the process of task selection, let us first observe how, and in what environment, an operative visualizes the work to be done. Before he crosses the threshold of his work area, he may see pinned to a wall the charts summarizing his team's production figures over the last six months and what they mean in terms of bonus payments. He then catches sight of the equipment to be repaired or serviced that the logistics department has just brought in, as they do every morning, and which they will have placed on different shelves depending on the type of procedure required, or gathered together on racks in the case of identical units. At the same time, the operative sees the colour of the tags attached to the equipment awaiting his attention: white for *reparative service* and yellow for *major services* and *standard services*. These tags indicate the date by which the equipment must be returned to the logistics department.

What choices do operatives have to make in respect of their work? On what basis? What rules and what experience inform their choices? What do operatives know at the moment they select the work to be done?

Operatives are familiar with two rules governing the prioritizing of work because they are written down, updated and displayed. These are the schedules for *major services* and *standard services* and the *debt sheet*, which shows operatives on a twice-weekly basis the stock levels of the various units and electronic circuit boards required by the line operators and the logistics department. Thus each operative knows how many of each component are required (units or individual boards). A team has a *line debt* when one of the line operators is forced to take a train out of service because it is unable to replace a faulty unit. It has a *store's debt* if the logistics department does not have enough stocks of such and such a part to meet the needs of the line operators. It should be noted that repaired units and circuit boards do not go straight back to the

individual lines but are sent first to the AME logistics department. This second level of debt constitutes a safety margin, ensuring that the logistics department can always meet demand from the lines. A *line debt* is very rare, a *store's debt* much less so. The level of *debt*, which is fixed by logistics technicians, depends on the existing stock, frequency of breakdowns, the age of the equipment and so on, and therefore varies from component to component. Operatives have extremely accurate knowledge of all these elements, which they have acquired through experience and informal discussions with the logistics team when relations are good. Not all this knowledge is necessarily written down.

In reality, the *debt sheet* displays all the work priorities but without separating them out and with a very short time horizon of just a few days. Thus it contains some of the information pertaining to the service schedule, which has a longer time horizon of between one and three months. With that in mind, each operative has to determine the sequence of procedures to be carried out on the basis of what he thinks he and his colleagues will have completed when the second *debt sheet* of the week arrives. Thus he has to anticipate which items will soon be in deficit, since the *debts* notified on a Tuesday will have to be discharged by Thursday, and so on. Another factor he has to consider is the schedules for the *major services* and the *standard services*. Finally, he has to take account of established practice in respect of preventive maintenance procedures, technical modifications and any reconditioning work that may have to be done. For example, any equipment withdrawn for corrective maintenance, which is already two-thirds of the way towards its next service, has to be serviced straight away. It is customary for the first operative in a team to have competed the work from the day before to highlight the priority items with a marker pen in order to simplify his colleagues' work. Bar codes have now replaced marker pens.

It was against the background of these rules governing work organization that the new productivity bonus, the so-called DEC, was introduced, the results of which are on display at the entrance to each team's work area and constantly updated. The operatives know that half of the bonus payment depends on output volumes, expressed in terms of 'weighted output units', and that the other half depends on work quality. There are two aspects to work quality. Internal quality is a measure of each team's ability to carry out

repairs within the times allotted and is evaluated by the level of its *debts* to the logistics department. External quality depends on client satisfaction; it is a function of the failure rate of repaired equipment. A repair is said to have failed if there is another breakdown in the six months following a corrective procedure. Finally, operatives know that all the operations they carry out on a unit of electronic circuit boards, on a single board or in the course of a *major service* are entered in the operating account in WOUs, which are equivalent and interchangeable with each other.

To what extent does this wage rule interfere with the other rules governing work organization when it comes to selecting the procedures to be carried out? One of the ways of examining this question is to analyse the line of reasoning some operatives might follow and the types of tasks likely to be selected by an operative seeking to obtain the maximum bonus while expending the minimum effort. First, it would be in his interest to select procedures that generate the most WOUs per unit of time that is corrective rather than preventive procedures, within the limits imposed by the rules on priority. Secondly, on the assumption that the operative does not locate the source of the fault straight away, it would be in his interest to return the unit to the line in question as quickly as possible, marking it 'NTR', rather than testing it n times with no guarantee of success. An item marked 'NTR' ('Nothing to Report') equates to one WOU, just as a corrective procedure does. At this stage, although the maximum bonus can be obtained, there is no guarantee that the effort is minimal. For that to be the case, not only would the operative have to be able to assess his team's position relative to the bonus threshold, but he and his colleagues would also have to be able to slow down or increase their work rates in order to stick at that level. Such a strategy of evaluating a team's output level in real time is, however, impossible to put into effect. Even if each operative does what is required of him and enters into the computer at the end of each day all the procedures he has carried out and the time spent on them, the computer system has been designed in such a way that the operatives cannot use their terminals to add up either the procedures carried out or the time spent on them. Each operative would have to keep a double account not only of his own work but also of that of his colleagues; this is theoretically possible, but it would take too much time. In fact, operatives are fairly

successful in estimating their BPU's output level ('I know without realizing it' one of them said) and most of them have a notebook in which they write down the details of what they enter into the computer system. The operatives in the other BPUs would have to do the same, since the bonus is calculated on the basis of the output of the team as a whole. A group strategy of this kind would require a degree of coordination that would, in turn, demand not only considerable mental effort but also the agreement of every operative not to exceed the maximum effort norm. Even supposing that was possible, it would not obviate the impossibility of predicting the volume of items withdrawn for corrective maintenance, which means that any possibility of sticking at the level of the maximum threshold would depend on a happy coincidence, as is shown by the fluctuations in teams' result from one month to the next. It would seem that the wage rule cannot, by itself, guide either the choice of tasks or work rates.

It remains to be discovered whether an operative can, instead of referring to the rules outlined above, adopt a 'free rider' strategy and attempt to select from among the equipment in deficit those items that are easiest to repair, even if it is not financially worthwhile. It so happens that such behaviour conflicts with a working practice established long before the DEC was introduced; in order to avoid any temptation to choose the easiest procedures, operatives have long been in the habit of taking the equipment to be repaired first and only afterwards looking at the tag attached to it. The aim of this practice is to dispel once and for all the notion that unfair work strategies are acceptable in order to preserve a good working atmosphere. According to one operative, 'it's an implicit rule that new recruits apply instinctively'.[4] The fact that new operatives work alongside an experienced hand for about six months makes it easier to pass on such practices. Finally, the development of free rider strategies, in so far as they come to light, strongly suggests that the DEC has a certain financial or symbolic importance, which operatives had been at pains to deny when it was introduced ('The DEC is dirty money').

It would appear that operatives cannot be guided solely by the *debt sheet* in deciding on the order in which the various procedures should be carried out; if they did adopt this strategy, they would not have the time required to deal with the *major services*. This would

paralyse the trains and lead to the imposition of penalties. If it is to be followed, each of these rules requires the mobilization of individual and collective resources, some of which are contained in other rules, such as those the logistics department applies in managing the state of the rolling stock. Thus operatives have to draw on knowledge that can be acquired only through experience: knowledge about the state of the rolling stock, wear and tear on machinery, the quantities of spare parts held in stock, and so on. He also has to rely on the cooperation of colleagues involved in work preparation, who have their rules as well. Thus in one of the teams, one operative carries out a daily inspection of all the drawers containing the components required for repairs – the so-called *advance stock* – and goes down to the logistics department in order to obtain fresh supplies. Finally, operatives have to pay attention to their immediate environment: they will not select the same tasks if the test bench is out or order, the spare part is not available or if they have recently repaired the same type of device. Operatives can register all this at a glance, without really being aware of it: the pile of units awaiting repair nearby, their colleagues' work, the state of the test bench, etc.

For all the reasons just outlined above, these various rules governing work organization are incomplete. Each one has to be interpreted in the light of information contained in other rules and of a considerable volume of tacit knowledge, the importance of which was demonstrated by Michael Polanyi (1967). Thus no rule is in itself sufficient to guide a realistic selection of tasks, one that respects all the rules governing the prioritizing of work while at the same time being compatible with established working practices. Consequently, no rule can strictly determine individual choices and hence behaviour. This incompleteness is inherent in the rules themselves. First, a rule cannot serve as a guide to the resolution of all problems at the same time. Secondly, it brings into play knowledge and information that are not contained in the rule itself. The incompleteness of the rules explains why it is impossible for operators to follow just one rule. In reality, it is a whole system of rules that they follow: rules governing work organization, safety, pay and so on. Each of these subsets is closely linked to the others. One important property of rules emerges from this: they form a structure made up of several interlinked subsets, somewhat like a

network. Thus explanations that supplement the previous ones, such as: 'We check out the MS (major service) shelves. If the parts are piling up, they have to be done; the debts are sacrificed' or 'we glance briefly at the shelves', reveal in very concrete terms how the operatives follow the rules. They have found tangible reference points that equate to the written instructions that all these rules constitute. This key element in the situation enables them to dispense with formal rules until such time as new information or problems appear. In this example, the operatives have created for themselves a rule governing task selection: rising demand for *major services*, which is all too evident from the growing piles of parts on the shelves, triggers a decision to give priority to preventive maintenance procedures over corrective procedures. Such a rule governing task selection is not self-evident: the operatives could have chosen to ignore the growing piles of parts requiring major services in favour of corrective procedures, which are often more profitable in terms of bonus payments.[5] This clearly represents the stabilization of an interpretation of the reference point, which we denote, for want of a better word,[6] by the term routine. It would be particularly misleading to think that the act of 'glancing briefly at the shelves' constitutes a rule. Such a gesture, made without being really aware of it, is a routine.

It would appear that the adoption of concrete reference points such as the one just described is one of the ways in which rules are followed and applied. In this type of work, this is perhaps the most frequent case and probably the most economical one from the cognitive point of view. Since we have arrived at the same notion, it now seems essential to examine the evolutionary literature on routines in order to assess the relevance of the notion, to clarify our concept of routines and, finally, to elucidate the role we attribute to them in the management of the incompleteness of rules.

Routines in evolutionary literature

The notion of routine was originally developed in artificial intelligence. It is to two Nobel laureates, Hayek and, in particular, Herbert Simon, that we owe its introduction into the social sciences. Evolutionary theory is based on their contributions.

The four notions of routine in the literature

A reading of the principal texts on the topic (Cyert and March,1963; Nelson and Winter,1982; Dosi *et al*., 1992; Cohen and Bacdayan, 1994; Cohen *et al*., 1996, etc.) reveals two possible points of entry into the notion of routine.[7]

In the first, a routine is considered to be a pattern of behaviour. Indeed, some authors, such as Egidi, have adopted the expression 'routinized behaviours' and reserve the term routine for use in computation theory.[8] However, two ambiguities remain. The first, stemming from the biological inspiration of the theory, has to do with the level at which the concept applies. Does it apply to individuals, organizations, or to both? If it applies to both, then we have to explain how the transition from one to the other is effected. Thus for Nelson and Winter (1982), routines may, at certain times, 'refer to a repetitive pattern of activity in an entire organization, (or) to an individual skill' (p. 97). Rare are those who, like Cohen (1987) or Cohen and Bacdayan (1994), reserve the notion of routine for either individuals or organizations. The second ambiguity has to do with the characterization of patterns of behaviour or of related concepts such as: (i) 'patterns of regular and predictable behaviors' (Nelson and Winter, 1982); 'patterns of interactions, which represent efficient solutions to particular problems' (Dosi *et al*., 1992: 191); (iii) 'behaviors guided by norms' (Dosi *et al*., 1997), (iv) 'a way of doing things' or, more precisely, 'a relatively complex pattern of behavior … functioning as a recognizable unit in a relatively automatic fashion' (Winter, 1986: 165); (v) 'sequences of patterns of actions that lead to the realization of a final goal' (Egidi, 1996: 330); (vi) 'established patterns of organizational action': 'By organizational routine we mean patterned sequences of learned behavior involving multiple actors who are linked by relations of communication and/or authority' (Cohen and Bacdayan, 1994: 555).

The ambiguity stems from an all-embracing definition of the notion. The fact that a routine is a pattern of actions does not mean that all such patterns are routines. Aware of this difficulty, the leading experts on the question (Cohen, Dosi, Egidi, Marengo, Warglien and Winter) met in Santa Fe in August 1995[9] in order to try to specify what should go in which category. In the second point of entry, a routine is defined as a capacity for learning that takes a different form depending on whether or not time plays a

role. This, is seems to me, is the only way of understanding the distinction Dosi, Teece and Winter draw between static and dynamic routines (Dosi *et al*., 1990: 243): 'Static routines embody the capacity to replicate certain previously performed tasks'. However, with repetition – and hence over time – routines can always be improved, as can be observed from learning curves. Dynamic routines have within them the notion that, by doing, it becomes possible to learn and to transform: 'Dynamic routines are explicitly directed at learning' (Dosi *et al*., 1992: 192).

We propose to combine this twofold distinction – individual/organizational and static/dynamic – in order to highlight four meanings of the notion of routine. Each of the numbered cells in the table we have constructed shows the concept that seems to us to best characterize each of the four pairings of one row and one column. Below each concept we show the theory that seems most closely associated with it. Note that we have not sought to provide a unified vision of the notion of routine (no such thing exists).

Cell (I): static routines at the individual level are best characterized as skills. They express a capacity to execute the same task repeatedly and can be classified as 'satisficing'.[10] We draw on Cohen and Bacdayan (1994), who explicitly reserve the term 'skill' for the routines of individuals, and above all on Nelson and Winter (1982),

Table 4.1 The multiple meanings of the term 'routine'

Type of behaviour γ *Learning capacity* α	*Individual*	*Organizational*
Static	(I) 'skill' or 'routines in a narrow sense' (Nelson and Winter, 1982; Cohen and Bacdayan, 1994; Winter in Cohen *et al*., 1996)	(II) 'standard operating procedures' or 'rules of thumb' (Cyert and March, 1963; Nelson and Winter, 1982; Winter in Cohen *et al*., 1996)
Dynamic	(III) 'Individual problem-solving capabilities' (Winter in Cohen *et al*., 1996)	(IV) 'Search' (Nelson and Winter, 1982; Dosi and Egidi, 1991; Nelson, 1995; Winter in Cohen *et al*., 1996)

for whom routines (in the sense of skills) are synonymous with the capacity for coordination in a normal situation. Nelson and Winter emphasize the automatic quality of routines by comparing them to computer programs. This comparison also features in Stinchcombe (1990: 63):[11] 'The parts of an individual's skill which are completely routinized are the parts that he or she does not have to think about – once a routine is switched on in the worker's mind, it goes on until the end without further consultation of the higher faculties.' However, routines, in the sense of skills, have another property: they are a form of tacit knowledge. As Polyani (1967: 4) notes: 'We know more than we can tell.' Thus routines form a set of implicit arrangements that are not recognized as such by the individual adhering to them.

Cell (II): static routines at the level of organizations are the 'standard operating procedures' or 'rules of thumb' defined initially by Cyert and March (1963: 101) and subsequently by Nelson and Winter (1982: 17). These are decision-making rules adopted by firms. For example, 'standard operating procedures' make it possible to establish a firm's output level in various contexts (Nelson, 1995: 69). They are fairly simple and can be carried out on the basis of minimal information. They constitute 'an organization's memory' (Cyert and March, 1963: 101), a notion that Nelson and Winter (1982: 99) were to adopt verbatim in their definition of routines and that was subsequently to be adopted universally. For Nelson and Winter, the more important routines are, the less necessary the knowledge of others is.[12]

Cell (III): dynamic routines operating at the individual level are based on each individual's ability to solve new problems without undermining the organization's general functioning. The term 'individual learning' is the one that corresponds most closely to this notion. Individuals' abilities to seek out solutions, which constitute forms of individual learning, rely on heuristics, that is on concepts and dispositions that suggest an overall direction and provide a common framework for dealing with similar problems (Winter in Cohen *et al.*, 1996: 663).

Cell (IV): patterns of behaviour operating dynamically at the organizational level correspond to the notion of 'search', whose architects are Nelson and Winter (1982: 171–2). The term 'search' denotes, first, a mode of behaviour – 'search behaviour' – characterized by a process

of experimentation based on trial and error. As such, it is quite distinct from the 'satisficing' behaviour associated with skills, which is not directed towards the search for innovations. However, *search* also denotes a usually intentional process through which the best way of doing things is arrived at. This is what Nelson (1995: 69) calls a deliberative process.

The efforts of the Santa Fe working group culminated in a proposal for a common definition of the notion of routine (Cohen *et al*., 1996: 683). It is 'an executable capability for repeated performance in some context that has been learned by an organization in response to selective pressures'. There are four important points here: aptitude, the role of context, learning and selection: 1. aptitude is characterized by the capacity to generate an action and to guide or direct an action sequence; 2. execution is possible only in an organizational context that is considered as a form of external memory or as a representation of portions of routines; 3. the emphasis placed on learning implies that it is possible, but not certain, that routines are tacit or automatic in nature; and 4. routines are the outcome of a selection process.

A routine is an action pattern, but clearly not all action patterns are routines: witness heuristics and 'rules of thumb'. And the Santa Fe group did not succeed in specifying with sufficient precision criteria that would have made it possible to establish a distinction between routines and other action patterns.

The contrast between routines and algorithms

We define *a routine as a transformation mechanism* intended to obtain a particular result. Routines are *located* mechanisms embedded in particular contexts, since the problems in need of resolution are susceptible only of local exploration: individuals do not have full knowledge of the world. This is perhaps a point on which we beg to differ with Egidi (1992: 170, note 4), for whom 'routine' is here a synonym of 'not completely specified procedure', which might lead one to think that a complete specification were possible. We also disagree on this point with Dosi, Teece and Winter, for whom the complexity of individual behaviour stands in the way of a codification of routines and their transformation into rules.

A notion that is close to that of routine in the sense that it is also an aid to decision-making, but which is also diametrically opposed

to it, is that of algorithmic procedure.[13] 'An algorithm is a finite list of instructions that have to be followed in a given order. By following the list of instructions step by step, one should arrive at a result after a finite number of steps. The result should be reproducible in an infinitude of individual cases that are all dealt with in the same manner' (Lassègue, 1994: 49). A computer program is an example of a procedure.

The first criterion by which we differentiate between these notions is the nature of the reasoning required to apply them. This may be purely cognitive: calculation, selection, search for an algorithm, and so on (hypothesis H1). Alternatively, it may be located, in which case the context is such that there is little room for manoeuvre and the application is almost over-determined (hypothesis H2). In the first case, we are dealing with an algorithmic procedure and in the second with a routine. The implication of hypothesis H1 is that agents are purely cognitive beings who make their calculations in a world without context. This hypothesis does not apply to the real individuals whose coordination we are investigating. Hypothesis H2, on the other hand, means that agents are pseudo-reactive: they react to a context characterized by a limited number of possible choices.

Procedures and routines differ in other respects. The reasoning of greatest importance for the conduct of future action is performed at different points in time: before the execution of a procedure but during the application of a routine. Procedures are explicit and codified, while routines are tacit. The execution of a procedure does not require any interpretation because it takes place in the domain of syntax and of the calculable. The kind of rationality at work is procedural, in Simon's sense of the term (1976). The results of procedures require interpretation. A routine, on the other hand, requires only a minimum of interpretation because it operates within a domain already delimited by the interpretation of a rule. That is why routines are part of an adaptive rationality that puts the emphasis on the experimental learning undertaken by individuals and groups (Cyert and March, 1963). Table 4.2 summarizes these differences.

This outline of the multiple meanings of the notion of routine in evolutionary theory conveys the impression that routines are everywhere, and therefore nowhere, in economic life. How can we make

Table 4.2 Procedures and routines

Procedure or algorithm	*Routine*
A finite list of instructions to be followed in a given order and leading to a reproducible result	A routine is a mechanism for effecting transformations with a view to obtaining a result; a way of acting
Non context-bound, since all possibilities are explored	Context-bound, since the problem is explored locally
The solution is guaranteed, either with a certain probability (probabilistic algorithm) or with certainty (deterministic algorithm)	*A* solution is not guaranteed by the application of a routine
The problem *has been explored systematically*, at least to a certain point	The problem *is* explored pragmatically: it is by adopting routines that the solution may be found. The solution is not 'found' in advance
Explicit, codified character of the procedure γ Transferable or reproducible	Tacit, non-codified nature of the routine γ Not really transferable from one firm to another unless the contexts are similar
Carried out automatically (absence of interpretation)	Minimal interpretation required for routine to be selected
Procedural rationality[14] (Simon, 1976)	Adaptive rationality (Cyert and March, 1963)

sense of this? The radical difference between our concept of routines and the algorithm of a Turing machine affords us an opportunity to redefine routines around the idea that they are closely linked to an interpretation of rules. This point is developed in the next section.

Routines and 'the void at the heart of rules'[15]

Routines as pragmatic resolution of problems

Our observation of the RATP teams revealed a second difference between rules and routines, the first being the explicit/implicit antithesis. Since the fundamental characteristic of rules is their general nature (which explains their distance from the solution[16]), routines are a form of *pragmatic resolution* that can be applied to a

problem to which the rules give only a *theoretical, abstract and general response*. We can say that rules constitute the background for routines or that routines are, as Egidi points out (in Cohen *et al.*, 1996: 687), rule-based patterns of behaviour. The distinction Argyris and Schön (1974: 7) make between the 'theory-in-use' and the 'espoused theory' of the members of an organization helps to clarify the difference between rules and routines. 'The "espoused theory" is the theory to which an actor gives allegiance and which he communicates to others when they ask. On the other hand, the theory that governs his actions is his "theory in use", which may or may not be compatible with the "espoused theory". Moreover, the agent may or may not be aware of the compatibility between the two theories.' Rules reflect the organization's 'espoused theory', while routines reflect the actors' various 'theories-in-use'.

In order to apply a rule, which is by definition incomplete, it is necessary to seek out solutions that are based on the information derived from the context, experience of similar cases, reference to custom and practice, etc. It is the development of certain modes of behaviour, which, through repetition, creates routines. In a sense, routines provide a pragmatic, local and temporary solution to the incompleteness of rules. Since routines emerge only in the course of action, they are virtual and come with no guarantee of success. This is also what constitutes their dynamic. This approach to the role of routines in managing the incompleteness of rules is very close to what Bourdieu (2000: 160) says with regard to the way rules operate: 'It is habitus that fills the void at the heart of rules'.[17] Thus routines and rules complement one another.

Let us take the following example. An operative who is repairing a printed circuit board solves any problems himself by applying, for example, the rules of basic electronics. The operative does not need to draw on all the rules of electronics, electricity, etc., which he knows, but just on those he considers necessary as the repair proceeds. Consequently, his actions are governed by a restricted set of rules that summarize the relevant interactions between the tasks to be performed and the set of appropriate actions. The operative's mental processes consist of recognizing the models that trigger the appropriate action, repetition of which leads to an apparently 'routinized' pattern of behaviour. However, the routinization is only apparent, since the operative must be able to change rules when he

encounters radically new problems. In such processes, routines appear to be interpreted rules or pragmatic, interpretative working practices. This point highlights the thin line that separates the act of following the rules from that of adopting routines.

Routines, cooperation and the suspension of indeterminacy

In a social world made up of incomplete rules, routines emerge as one of the devices that enable individuals to follow rules. Until now, we have implicitly assumed that individuals intend to cooperate, which is not self-evident. Our whole argument would be undermined if we failed to resolve the problem of the indeterminacy inherent in cooperation. How do routines help to resolve this question?

With the introduction of the team productivity bonus, cooperation among the operatives in a team had acquired another possible meaning, making it susceptible to periods of destabilization. In addition to the two existing motives, namely providing a service for the line operators and the satisfaction of a job well done, cooperation could now be a means of ensuring that the bonus would be paid. Under these circumstances, none of the operatives had any guarantee that his intentions (for example, to work without cheating) would be understood by his colleagues. If an operative signalled his cooperation, nobody could consider that apparently favourable signal as definite proof of cooperation.

Let us put forward the following two contradictory propositions: an operative is cooperating in the interests of the line operators and that same operative is not cooperating in the interests of the line operators. Thus the proposition 'he is cooperating in the interests of the line operators' is indeterminate in the sense, already explained in Chapter 1, that two contradictory interpretations of a single situation are possible. After all, at least one of the arguments in the line of reasoning leading to interpretation A (operative X is cooperating) can be adopted as one of the premises for at least one other argument in the line of reasoning leading to conclusion B (operative X is not cooperating), which contradicts interpretation A. Thus, in our example, the possible explanations for operative X's increased work rate (he is making up for lost time, putting his colleagues off their guard in order subsequently to adopt a 'free rider' strategy, feeling guilty under his colleagues' scrutiny), at least one of them (putting

his colleagues off their guard) could serve as a premise for operative Y, who might deduce that operative X does not want to cooperate.

This argument applies in the same way to the case in which operative X decides to cooperate with his colleagues while at the same time reducing his work rate. However, operative Y has several ways of interpreting this situation. Operative X may be anticipating that the upper bonus threshold will be exceeded and be concerned that the productivity targets might be revised, which would affect his colleagues; he may be tired or just slacking; the urgent workload may have eased; he may be experiencing difficulty in locating a breakdown, and so on. If operative Y accepts the first explanation (anticipation of the team's results), he will deduce from it that operator X does not want to cooperate!

Thus in both cases, each operative finds it impossible to determine whether his interpretation of the other's behaviour corresponds to what the latter was actually seeking to signal. We are dealing here with a form of *indeterminacy* that we define thus: two natural language interpretations A and B of a single situation are indeterminate if at least one of the arguments deployed in support of interpretation A can be adopted in support of interpretation B, A and B being, at least in one sense, mutually contradictory.

This indeterminacy, which is linked to the fact that we ascribe intentions to individuals when they obey a rule, has one fundamental consequence: it can be an obstacle to rule-based coordination. It is not because each individual obeys the rules that he or she intends to behave in such a way as to achieve maximum coordination. When it comes to intentions, there will never be any guarantees at all unless routines are put in place.

By virtue of being automatic and mechanical, routines prevent the actors within an organization from questioning their colleagues' intention to cooperate in pursuit of a collective goal, particularly when each individual finds it impossible to ascertain whether his interpretation of another's actions is indeed the one the latte was seeking to signal. Routines temporarily dispel the indeterminacy inherent in cooperation. In a way, they enable each individual to forget the Other. As Nelson points out (1994: 249), in a context in which more than one actor is involved, routines lay down what each one has agreed to do. For Nelson, a routine is an implicit contract.

Routines give an organization an identity because, by virtue of their tacitness, they cannot be transferred outside the organization. Marengo (1992) stresses their function as promoters of cohesion. Dosi *et al*., (1992) compare them to Williamson's 'specific assets' (1975, 1995). However, they can also be regarded as 'collective assets', in the sense that they contribute to the formation of active organizations.

Conclusion

In economics, the pertinent question with respect to rules is the same as in philosophy since Wittgenstein: what does 'rule-following' mean and how are rules to be followed? Organizations and work groups lead us to develop a structural vision of rules: because each rule is incomplete, it has to be interpreted in the light of the other rules and also of a large volume of tacit knowledge whose importance in the functioning of organizations is no longer in dispute (Cohendet and Steinmueller, 2000). Observation of real-life work situations shows that, in order to apply rules, operatives have to supplement what is not specified with contextual information, experience of similar cases, custom and practice and their own capacity for invention. It is the further development of these various behaviours that turns them into routines. In this sense, routines represent a pragmatic, local and temporary solution to a problem to which the rules provide only a theoretical, abstract and general response.

5

How Rules Operate in Practice: the Team Productivity Bonus, Productivity and Work Quality at AME, 1992–2000

According to incentive theorists, rules produce the same results wherever they are applied. This reason for this, it is said, is that they are implemented mechanically by actors who are assumed to be identical and within groups that exist only through the temporary interaction of individuals. When this is not the case, the only possible explanation must lie in the fact that the groups being compared (work teams) are not comparable, primarily because their technical and individual characteristics are too heterogeneous.

The AME of the Paris Métro offers particularly fertile ground for investigating the effects of identical rules on work groups. Such opportunities are rare indeed, since organizations seldom keep data such as those kept by AME over such a long period. Eight years have now elapsed since the introduction of the team productivity bonus scheme, or DEC to use its French acronym; this is sufficient time for us to be able to take stock and bring our investigation to a successful conclusion, provided we can first demonstrate that the teams are comparable and that the exogenous shocks, if there were any, have been neutralized by certain rules governing the management of the DEC.[1] This is the subject of the second section of this chapter. Subsequent statistical analysis of the evolution of labour productivity and of work quality indicators (debt levels and fault recurrence rates) among the AME production teams and examination of the amendments to the team contracts produce two main findings. The first is that teams adopt different strategies in order to obtain maximum bonus payments. This is reflected in their dissimilar records in terms of productivity gains, improvements in work

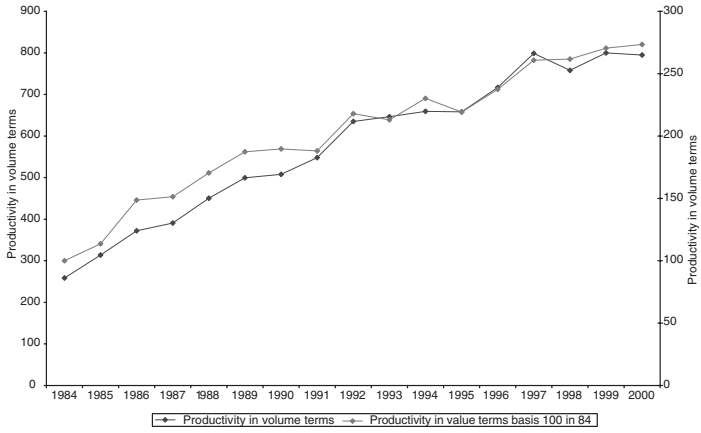
quality and group dynamics. The second is that labour productivity emerges as a negotiated variable that is a collective construction (the third, fourth and fifth sections of this chapter). Finally, before immersing ourselves in the intricacies of team strategies, we need briefly to trace the evolution of productivity before and after the introduction of the productivity bonus. In order to do this, we will draw on data provided by the AME. The bonus scheme, which was initially conceived as a rule to encourage increases in labour productivity, has probably not produced all the effects at an aggregated level, that its advocates were hoping for (see the first section of this chapter). We will attempt to ascertain the significance of this finding in the light of the various teams' performance.

The slowdown in labour productivity following the introduction of the team productivity bonus

Labour productivity, measured in volume terms as the number of WOUs produced per operative over a 12-month period,[2] does not increase at the same rate before and after the introduction of the DEC. Between 1984 and 2000, the annual rate of growth in labour productivity was +7.3 per cent; however, the rate was much higher in the period preceding the introduction of the bonus than afterwards. From 1984 to 1992, it was +11.9 per cent per annum, while from 1992 to 2000, it fell to +2.8 per cent per annum (Figure 5.1).

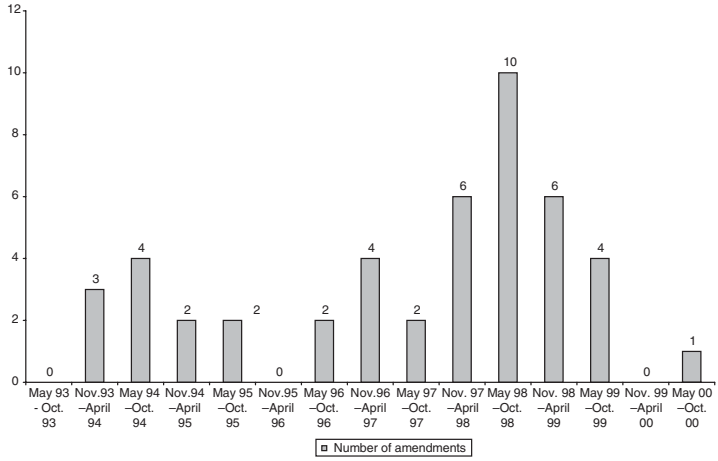
In particular, in the three years following the introduction of the DEC (1992–95), labour productivity stagnated (+1.2 per cent per annum). The period 1995–2000 saw an improvement (+3.8 per cent per annum), despite the mediocre results for the year 2000 (–0.65 per cent).

These results raise two questions. Why did the rate of productivity growth slow down for the first three years? Is the improvement from 1995 onwards real or does it reflect a different mode of managing the DEC? This question is particularly pertinent in the light of the fact that, of the 46 amendments to the team contracts negotiated since the introduction of the DEC, no fewer than 24 were added during a short period of time between November 1997 and April 1999 (Figure 5.2). Analysis of the situations in the individual teams will help us answer this question. In any event, we will hypothesize that the year 1995 marked a turning point, either towards a real recovery in labour



Source: Author's calculation from the AME data.

Figure 5.1 Evolution of labour productivity in volume and value terms in AME, 1984–2000



Source: Author's calculation from the AME data.

Figure 5.2 The number of amendments signed at AME between 1992 and October 2000

productivity or towards other, more realistic ways of managing the DEC that took greater account of the economic constraints and which we would be tempted to label 'the social management of the DEC'.

The comparability of the teams

The production teams can be said to be comparable, both over time and among themselves. The teams can be compared over time because they remained more or less unchanged in number during the period under consideration. Of the five teams at work in AME in 1984, four are still in existence in 2001. The survivors are EK1, EK2, EK3 and the micromechanics team. A new team, EK4, was established in October 1996. It is made up of units previously attached to other teams: two BPUs from EK1 and one from EKS; they were joined in March 1999 by the 'Relays in Critical Failure Mode' unit from the Relays team, whose other activities were transferred at the same time to another workshop.

Specialization and homogeneity of the teams

The notion that the teams can be compared with each other is based on several arguments and one fundamental idea, namely that their undeniable specialization is not a source of heterogeneity. After all, they work on different applications of electronics technology: control electronics in the case of EK1, automatic electronic devices and installations, such as Météor[3] and self-steering systems on the Métro, in the case of EK2 and power electronics in the case of EK3. Even the micromechanics team deals with electronics to some extent, since it is responsible for repairing the trains' electronic clocks. However, with the exception of the relays and micromechanics teams, they are dealing with the same 'technological family', in this case the 'electronics family', rather than the 'pneumatics family' or the other technological 'families' used in the Rolling Stock Department. Now one of the particular characteristics of electronic equipment is that, unlike micromechanical equipment, it is not subject to wear and tear. Consequently, reconditioning is the only preventive procedure carried out, generally once every ten years. This is important because preventive procedures cause difficulties within the teams: they require more working time, they are dirty, and so on. Thus the operatives in all the electronics teams[4] have the same types of procedures to carry out.

Firstly, specialization by sphere of application means that each team works on several different generations of technology[5], spanning some 40 years. For example, the electronic circuit boards main-

tained by EK1 may belong to the first generation (discrete components), to the second generation (analogical control systems) or to the third generation (micro-controller controlled units). The maintenance procedures undertaken by EK2, which specializes in automatic train safety systems, involve four generations of technology, the design of which varies from line to line: low frequency (first and second generations), high frequency (first and second generations), automatic operation and maintenance system (third generation) and the automatic train control system used on line 14 (Météor) (fourth generation). This has one basic consequence, which is that all the teams experience the same difficulty in finding components for the older generations of equipment.

Secondly, specialization can go hand in hand with a high degree of homogeneity between some of the teams. This is the case with EK4, which came into existence partly as a result of the splitting of EK1.

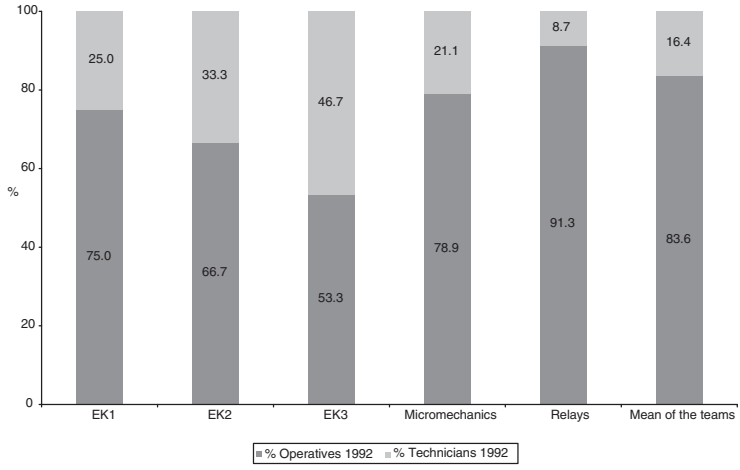
Thirdly, specialization does not partition the teams off from each other. One reason for this is that the AME recruits at workshop rather than team level. The same qualifications (or equivalents) are required for all the teams: the CAP (vocational training certificate), BEP (technical school certificate) or a technical *baccalauréat* in electronic engineering. Another is that operatives can change teams, with those who do working alongside a colleague for a period of six months to a year.

Consequences for the employment structure

The form of specialization described above means that the employment structure is fairly comparable between teams and that this structure has been distorted in the same way in all the teams. The decline in skill levels between 1992 and 1999, which is linked to recruitment difficulties, affected all the teams, as Figures 5.3 and 5.4 show.

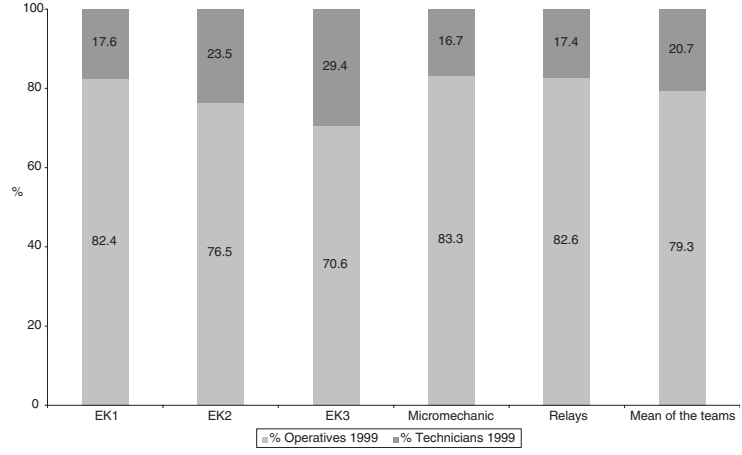
Making procedures equivalent: the 'weighting coefficients'

The notion that the teams are comparable is based on two other arguments of a different kind. First, the introduction of the productivity bonus gave rise to a need to create some sort of equivalence between the procedures carried out by the various teams. This is why the 'weighting coefficient' was devised; it is defined, for each BOU and for each type of corrective and preventive procedure, as the average number of hours required per procedure.



Source: Author's calculation from the AME data.

Figure 5.3 Skill structure by team in 1992



Source: Author's calculation from the AME data.

Figure 5.4 Skill structure by team in 1999

This ratio has been recorded in the AME database since 1991. Thus each procedure, modified by its coefficient, is equivalent to *n* WOUs, in which *n* is the weighting coefficient. This coefficient changes on the basis of an assessment of exogenous changes

affecting the working time required for a given type of procedure. We will see later how this rule, designed to create equivalence between different procedures, has been exploited in the strategies adopted by team seeking to maximize bonus payments. Secondly, in addition to a three-yearly review, the original team contracts provided for the negotiation of amendments in situations in which teams were likely to be penalized by an external event. As it turns out, a considerable number of amendments had been negotiated (Figure 5.2), mostly with the aim of preventing a team being penalized for events for which it is not responsible. Thus in the event of exogenous shocks, usually caused by problems with component supplies or the breakdown of industrial equipment, such as lifts (thereby paralysing the flow of equipment) or the machine used to polish and clean electronic circuit boards and test benches, an amendment to the team contract is negotiated. Consequently, exogenous shocks cannot be adduced as an explanation for differences in the various teams' results.

Reconstituting a monthly database for each team (November 1992–October 2000)

In order to analyse the effects of adding a new rule to an existing rule system, it was necessary to reconstitute a monthly database depicting the evolution over time of the various teams. This had to be done by using the current AME database, in which data is recorded in accordance with the current structure. Starting from the most recent period, production figures since the time the database was first set up (1994–95) were reconstituted as if the structure of the current teams had never changed, using the most recent weighting coefficients. The idea underlying this approach is to process the data as if the technical structure had remained unchanged in such a way that one WOU is always equal to one hour's work. The AME database uses current weighting coefficients to reconstitute the output and productivity series for each team broken down into its various current BPUs. With this approach, the notion of team loses its meaning, since any sense of evolution over time, reflecting changes in each team's remit as activities are transferred between teams, is jettisoned.

In order to reconstitute the evolution of the teams over time, it was necessarily, first, to reconstitute their remits and, using the non-weighted output figures contained in the current AME file, to

calculate the monthly WOUs by seeking out each BPU'S weighting coefficients and the changes to them, as detailed in the amendments to the team contracts. I carried out this work for all the teams, with the exception of the relays teams, whose computer files disappeared when the team transferred to the Sucy site in March 1999. Secondly, it was necessary to reconstitute debt levels and fault recurrence rates, potentially with a few possible errors.

For the period prior to 1995, I drew on a file containing data on all the teams for the year 1993 and on graphical data on the productivity bonus results, which I had kept since my first two visits to the AME. Nevertheless, there is a six-month period for which I was unable to find data (November 1994–April 1995).

Taking these monthly figures (November 1992–October 2000) as a starting point, I calculated the quarterly figures corresponding to the bonus payment periods. The two databases contain virtually the same indicators: output as measured by the number of WOUs, labour productivity in volume terms, debt levels and fault recurrence rates; the quarterly database also contains the percentage of the maximum bonus obtained by each team at the end of each bonus period. The other important source of information on which I was able to draw relates to the legal aspects of the bonus scheme: the original team contracts, the revisions negotiated at three-yearly intervals and all the amendments negotiated between the production manager and each team supervisor. Since the results obtained before the amendments were negotiated had not been recorded by AME, it proved impossible to measure the effect of an amendment on the level of bonus obtained. Nevertheless, there are a few examples drawn from direct observations between the months of October and November 1994 or taken from annexes to the amendments.

It was obviously necessary to reconstitute these data for all the teams in order to assess the degree of diversity within the results as a whole, in terms of both productivity and work quality. However, it also enabled us to define the parameters for the three teams whose strategies I examined in detail (EK1, EK3 and the micromechanics team).

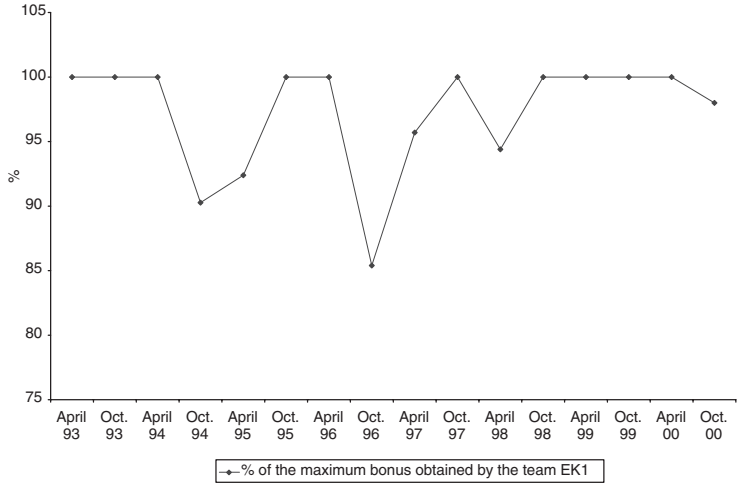
However, statistical analysis taken in isolation reveals nothing about the strategies adopted by operatives in order to obtain the maximum bonus. Those strategies can be reconstituted by eliminating those that are incompatible with certain results and by compar-

ing them with different data. Thus the statistical analysis has to be supplemented with data on changes to the rules governing the team productivity bonus scheme, and particularly to the weighting coefficients and to the upper limits on debts and fault recurrence rates as detailed in amendments to the team contracts, as well as with information on the management style adopted by the supervisors who took over as heads of the various teams.

EK1: maximizing the bonus through amendments to the team contract

Declining productivity but virtually maximum bonus payments

In the period in question, EK1 operatives almost always obtained maximum bonus payments,[6] 97.26 per cent on average. There are three exceptions to this. In October 1994, despite the fact that the team received 90 per cent of the bonus, it actually went through a real crisis, to which we will return later. In October 1996, the team was paid 92 per cent of the possible maximum bonus, while in April 1998 it received 94 per cent (Figure 5.5).

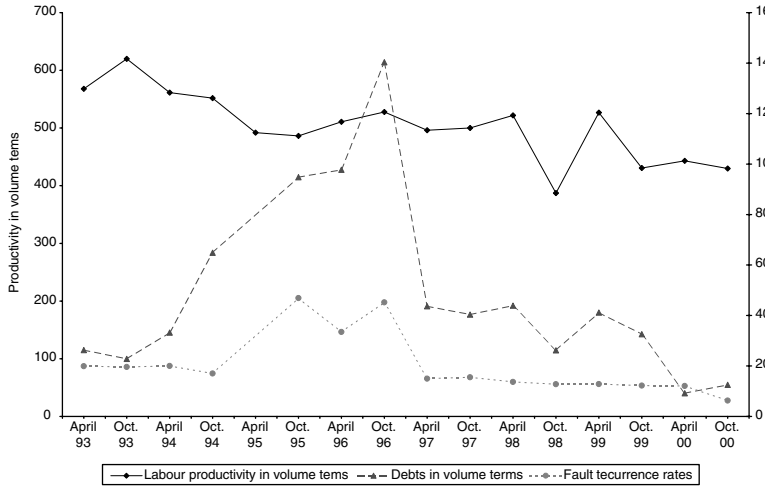


Source: Author's calculation from the AME data.

Figure 5.5 Percentage of the maximum bonus obtained by team EK1, 1993–2000

Over the period as a whole, EK1's labour productivity figures, as measured by the output volume in WOUs divided by the number of operatives, declined at a rate of –3.6 per cent per annum, while work quality indicators over the same period show an upward trend. Debts and fault recurrence rates declined at annual rates of –9.4 per cent and 14.2 per cent respectively, as shown in Figure 5.6. The fundamental question is whether the decline in labour productivity can be imputed to a reduced volume of work. If this were the case, we should expect the level of debts to stagnate or decrease; in reality, however, debt levels exploded from April 1994 until October 1996 and collapsed six months later. The reasons for these sudden variations will be explained below. However, the reason for the decline in labour productivity cannot be said to lie in a reduced volume of work.

This description is still too general to reveal the bonus maximization strategies; in particular, it does not take account of two extremely contrasting periods. In reality, for all three indicators analysed, there was a sudden break in October 1995.



Source: Author's calculation from the AME data.
Note: debt and faault recurrence rates are plotted against the second Y axis (on the right).

Figure 5.6 EK1: Evoluation of labour productivity, debts and fault recurrence rates, 1993–2000

During the first period (April 1993–October 1995), the team seemed unable to meet demand. Labour productivity declined sharply (–6 per cent per annum), while debt levels and fault recurrence rates increased at record speeds (+66.1 per cent and 40.9 per cent per annum respectively). The main reason for this was the ageing of the MF 77 stock. The quicker repaired units are returned to the workshop, the more the volume of work increases and the more the debts accumulate, even though operative effort remains constant. The correlation coefficient between debt levels and fault recurrence rates for the monthly data between 1992 and 1995 is high ($R^2 = 0.55$) and significant (cf. Annex C-1a).

During the second phase (October 1995–October 2000), the team's situation improved. Labour productivity decreased less rapidly, at an annual rate of –2.5 per cent per annum, while debt levels and fault recurrence rates decreased very significantly (by –33.3 per cent and –33.1 per cent per annum respectively). However, what is the explanation for this sharp decline in debt levels, given that a decline in the number of procedures per operative meant that the context was equally unfavourable? The reason is to be found in the arrival of a new supervisor, who made the reduction of debt levels his top priority. He noted an imbalance between the existing stock and actual requirements and embarked on a destocking exercise between October 1996 and April 1998. Fault recurrence rates also fell automatically as a consequence; the R^2 between these two variables was 0.84 (cf. Annex C-1b). These developments are summarized in Table 5.1.

Table 5.1 Evolution of labour productivity in volume terms, debt levels and fault recurrence rates:[7] EK1, 1993–2000

	Annual rate of increase in labour productivity in volume terms	*Annual rate of increase in debt levels*	*Annual rate of increase in fault recurrence rates*
April 1993–October 2000	–3.6	–9.4	–14.2
April 1993–October 1995	–6.0	+66.1	+40.9
October 1995–October 2000	–2.5	–33.3	–33.1

Source: Author's calculation from the AME data.

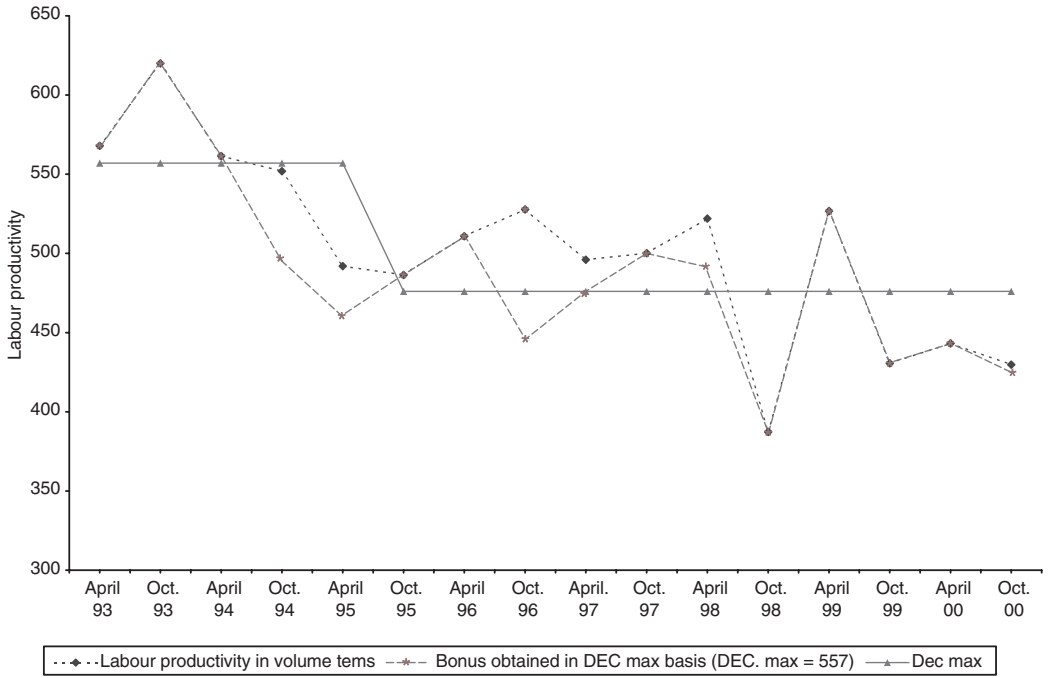
At this stage of the analysis, however, we do not yet have any economic or organizational explanation for the phenomena observed statistically.

Maximizing the 'weighted output units' and its limitations as a strategy

The following explanatory hypothesis is suggested: the operatives, as rational beings, seek to maximize the WOUs by selecting those procedures that minimize the time spent. Why? First, the bonus is attractive: 7000 francs is about 7 per cent of the operatives' average annual net wage. Secondly, output is the variable that offers operatives the most room for manoeuvre. Finally, output is the parameter on which half of the bonus is based, with the two quality indicators accounting for the rest.

In the phase immediately following the introduction of the productivity bonus scheme, the operatives came close to the output level that entitled them to the maximum bonus: according to the estimates made on the basis of the snapshot observations[8] the gap was +6.1 per cent. The operatives gave priority to the easiest procedures, those that generated the most 'weighted output units'. Among the corrective procedures, this meant giving priority to single circuit boards rather than whole units, etc. In the case of procedures involving parts with intermittent faults, there is a high risk that operatives will simply label them NTR after a cursory examination, without carrying out the necessary tests, and that this will have obvious repercussions on the fault recurrence rate (any part labelled NTR is entered in the operating account as one WOU).[9]

This strategy, which was adopted during the first two six-month periods that the productivity bonus scheme was in place (November 1992–October 1993), immediately proved to be 'profitable'. Labour productivity reached a level above that required to produce the volume of output triggering the maximum bonus, as Figure 5.7 below shows, and the operatives received the full bonus, since debt levels and fault recurrence rates were also good. Having achieved an output figure 11.3 per cent above that triggering the maximum bonus payment, it was rational for operatives to reduce their effort during the third six-month period while at the same time remaining at the maximum bonus level, particularly since a change to the rule had just been introduced. It was now possible to carry over output



Source: Author's calculation from the AME data.

Figure 5.7 EK1 Labour productivity, bonus obtained and DEC. max

in excess of the maximum bonus level produced during the winter period (November–April) to the summer period, when there is less work. The idea was to avoid penalizing operatives who had been able to satisfy demand in the winter period but who would not be able to obtain the full bonus[10] if they had less work in summer. This is what happened at the end of April 1994.

Obviously, the preference for procedures that generated WOUs in a minimal time is not always compatible with quality standards, whether external (fault recurrence rates) or internal (debt levels). First, a productivity strategy can reduce the reliability of repairs,[11] particularly when the equipment is ageing. The fault recurrence rate rises very sharply, which leads to massive indebtedness. Indeed, debt levels and the fault recurrence rate are very closely correlated (the R^2 is 0.55 and the test is significant: Annex C-1b). Secondly, maximization of the WOUs is not necessarily compatible with adherence to the priorities detailed on the *debt sheets*. This may be the second factor that contributed to the massive indebtedness from May 1994 onwards; debts reached an initial peak in October 1995 (Figure 5.6) and the team found itself in a critical situation. After six months' work in October 1995, it was only 2.6 per cent above the minimum DEC threshold. It was evident that this policy could not be pursued indefinitely: ultimately, it would be the trains that ground to a halt. This is why, from the end of October 1995 onwards there was a change of direction.

The following section describes the way in which the drive to maximize WOUs came into conflict with output quality, thereby undermining the credibility of the DEC in the eyes of the operatives. It so happened that, during this period (October and November 1995), I was observing operations in several teams, including this one.

Quality debates and the credibility of the bonus scheme

The context in which the team's results declined in this way was an unfavourable one. The equipment they were dealing with had certain particular weaknesses. First, it belonged to the earliest generation of electronic equipment used on the Métro, which was introduced in 1977. Secondly, the positioning of the racks of printed circuit boards did not allow for the type of maintenance desired by the RATP. When the MF 77 stock was designed, the plan had been

to make it possible to withdraw individual circuit boards rather than complete racks for maintenance. The regular withdrawal and follow-up monitoring of all racks were not made any easier by their awkward positioning on the trains. This technical complication explains why little maintenance was carried out in the early years and, as might be expected after 15 years' service, the age of the equipment was beginning to tell against it. Furthermore, it was not unusual for the supply of components to dry up when the manufacturers stopped making certain items because the MF 77 stock was getting old, and the equivalent parts were not always made available in good time by the RATP'S design office. Since they were dealing with rolling stock, the workshops were prohibited from modifying the equipment's frame of reference. The team had been waiting for one type of circuit board for two years, for this reason.

These factors cannot be said to be the primary cause of the decline in the team's results. None of them was new, not even the ageing of the rolling stock, which was an endogenous factor for all the teams. These factors were an integral part of the technological context in which the unit had been operating since its establishment and it had never before encountered serious problems. Thus the hypothesis of an exogenous shock be discarded. All these factors served rather to aggravate the existing situation.

So what happened? When the bonus scheme was first introduced, the operatives worked to maximize output. While output figures are seldom a matter of dispute,[12] the definition of quality can give rise to disputes on both sides. External quality, for example, is measured on the basis of the fault recurrence rate. Now this rate, which is defined by the ratio of the number of units withdrawn again within six months of repair to the number of units received for repair, contains a bias, since a piece of equipment may be re-installed on a train well after the fateful six months, sometimes as much as two years later. However, this does not prevent the fault recurrence rate being monitored over a given period. The other rule relates to internal quality, measured on the basis of the level of *debts* to the logistics department. In other words, the rule penalizes a team's failure to meet the deadlines laid down in the *debt sheets*. It is not easy to use these criteria in order to define the level of quality to be achieved. For example, operatives knew that some capacitors were reckoned to have reached the end of their

useful life after 15 years. Since all the equipment had been in use for more than 15 years, operatives might well have considered it reasonable to take advantage of the repairs being carried out to change the capacitors, albeit at the cost of extending repair times, which would be reflected in *debts* and a lower internal quality grade. It is not a simple matter to decide how far to go in making these changes and where the dividing line between preventive and corrective maintenance lies.

It was around the quality issue that the dispute crystallized. The breakdown of an efficient polishing machine did not encourage operatives to bother about the surface quality of the circuit boards, which consequently remained dirty and oily after being repaired, which gave the impression of slapdash work. In February 1994, when none of the quality indicators had deteriorated, the line operators voiced their dissatisfaction with the quality of the repair work being carried out, which in their view was poor. This led ultimately to the AME management ordering in July 1994 that *one-third of all corrective procedures should be supplemented by significant reconditioning work*. This was to involve polishing and cleaning, putting in rivets, changing the transistors on certain boards and the systematic replacement of capacitors. Operatives were to take one circuit board in three withdrawn for corrective maintenance, irrespective of its condition. This very arbitrary rule was intended to prevent work from piling up, which would inevitably have led to an increase in debt levels. Faced with this criticism, which they considered harsh but justified fied, the operatives decided not to obey management's instructions to recondition one-third of all boards sent for repair but to apply the notion of *total* quality to what they judged to be necessary work. This reaction can be interpreted in two ways. Either the operatives were seeking to highlight the contradictions between quantity and quality inherent in the bonus scheme, or they were trying to maximize the WOUs. If they chose to repair all the units in a magazine rather than just one-third, they would be able to record their work not as a single procedure but as a number of separate procedures equal to the number of units in the magazine. Since not all the units in a magazine undergoing *general reconditioning* are faulty, such a strategy is obviously profitable. Although both reactions are compatible, the subsequent unfolding of the episode gives good grounds for

believing that it was the desire to highlight the possible conflict between quantity and quality that prevailed.

The total quality approach soon revealed itself incompatible with the quantitative targets laid down in the DEC agreement, since procedure times were doubled.[13] This is why *debt levels* exploded and also explains the poor results recorded by the EK1 team as a whole (2–3 per cent of the productivity bonus in September 1994). Faced with this situation, management issued an order in October 1994 that the repair procedures should be scaled down, since it was impossible to allocate the necessary (human) resources to maintain quality levels without increasing debt levels. This order was difficult to interpret and to implement. The supervisor responded by drawing up a list of procedures to be carried out and those to be excluded. On his own initiative, and without consulting the operatives, he drafted a document based on the AME reference manual that also proved difficult to interpret, since it left plenty of scope for the inevitable ambiguities and individual judgement on the part of operatives. This conveyed the impression that there was a contradiction between the requirements of the line operators and those of the AME management and a degree of inconsistency between the pursuit of short-term objectives (elimination of *debts*, reduction in manning levels) and long-term interests (obtaining the resources to carry out technical modifications likely to lessen the impact of recurrent faults, extending the quality and cleanliness standards that had been trialed during the previous period to all circuit boards and to all procedures). Furthermore, in order to deal with the problem of indebtedness (I saw equipment awaiting repair piled up as high as the workshop ceiling, which made the place look as though a bomb had hit it), the supervisor asked the operatives in the unit to work overtime; this request, which was presented as exceptional, seemed to be both absurd, since it was out of proportion to the volume of work to be done, and illegitimate, since the objective was more to meet certain quality requirements than to satisfy any real need from the line operators. These measures had probably been wrongly interpreted by the operatives, since they involved maintenance procedures whose consequences would mainly be felt in the long term. For these reasons, the operatives refused to cooperate and the work was transferred to another team.

Towards a strategy of permanent renegotiation of results

During this period, the six-month bonus calculation period was drawing to a close, and management should logically have paid 2.6 per cent of the bonus to operatives who, everyone was agreed, had worked harder than before, despite the poor results. It was the supervisor, again acting alone and against the operatives' advice, who took it upon himself to negotiate the level of the bonus payment with management. The latter embarked upon a process of *debt discharge or neutralization*,[14] which led to the production manager and the supervisor reaching agreement on an amendment to the team contract that made it possible to pay 92 per cent of the bonus. The following commentary can be read on the output chart displayed at the entrance to the team's work area: 'Debts written off for this period because of the MF 77 circuit reconditioning campaign'. This marked the beginning of the team's policy of systematically negotiating amendments to their DEC contract.

In making such a firm stand and refusing to cooperate with management in restoring the situation to normal (rejection of overtime), the operatives were disputing the overall coherence of a system of incentives rules that failed to make the constraints of short-term profitability compatible with the aim of maintaining the rolling stock in good condition over the long term. They were adapting the *exit* strategy as analysed by Hirschman (1970). In making no demands of management, despite the obvious injustice of the situation, the operatives were showing themselves to be wholly disinterested, thereby lending credibility to their decision to adopt a total quality approach. By 'releasing' virtually the whole of the bonus, management, on the other hand, was admitting that there might be a dissociation between output volumes and payment of the bonus. In doing so, it was rejecting an excessively productivist approach to managing the productivity bonus scheme in favour of a more 'social' approach. This decision risked undermining the credibility of the DEC. It was not unusual during this period to hear the operatives saying: 'we'll get the bonus whatever happens'.

The episode of October and November 1995 seems to have opened the way for a different strategy, which involved bargaining over the results for the six months that had just finished (period t–1) and then using the negotiating results as the basis for calculating the productivity bonus to be paid in period t. And indeed, EK1 is the

team that has concluded that most amendments since the introduction of the productivity bonus scheme, a total of 16 between 1993 and the year 2000, an average of one every six months (cf. Annex C-2). At this stage, there is some value in outlining the various strategies adopted by the teams as reflected in the provisions of the amendments they negotiated. Some of these agreements constitute decisions to revise the rules laid down in the DEC agreement, while others invoke decisions, in the legal sense of the term, that are concrete, categorical and non-permanent. Some of these decisions adjust a team's past results, while others, anticipating poor results in the future, adjust them in *t*+1, *t*+2, and so on. Decisions to revise the rules do not have the same implications as decisions to modify the past or the future, particularly when it comes to the degree of credibility attached to the bonus scheme.

These differences, which serve to locate the strategy adopted by EK1, are summarized in Table 5.2. The table is based on an examination of all the amendments concluded in the OF AME, the aim of which was to classify them on the basis of various criteria. What was modified? For what reasons? Who were the team supervisor and the

Table 5.2 Decisions and revisions of rules in amendments to the DEC agreement, 1992–2000[15]

	Past	*Future*	*No. of amendments 1992–2000*
Teams	*No. of decisions adjusting the result of the DEC in* t – *1,* t – *2*	*No. of decisions to revise the rule*	
EK1	16	0	16
EK2	4	2	6
EK3	2	5	7
EK4 (from late 1996 to 2000)	2 ½	5 ½	8
Micromechanics	2	5	7
Relays (1992–March 1999)	0	2	2
Total	26 ½	19 ½	46

Source: Author's calculation from the AME data.

production manger when the amendment was signed? Does the amendment constitute a decision to revise the rule or does it invoke a decision? Does this decision relate to the past or the future? All of this is listed in greater detail in Annexes C-3 and C-4.

All the amendments negotiated by EK1 are decisions that modify the results of the previous period, particularly the level of debts, with phrases such as: 'debts must be adjusted as follows …'. The method involves allowing exceptions to the results that count towards the calculation of the productivity bonus. EK1 is the only team that has more or less systematically modified its actual results; finally, the amendments concluded since 1998 have led to the team being paid the maximum bonus.

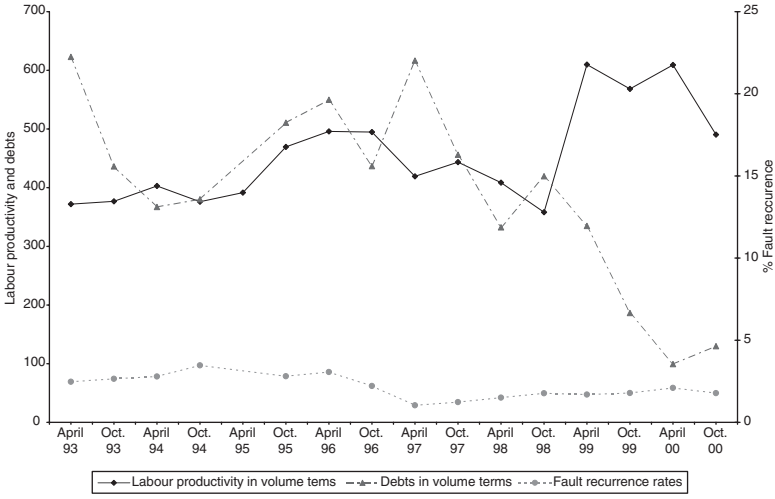
One fundamental and probably unusual conclusion emerges from this analysis: the bonus paid always equates to an actual daily working time of 6 hours 50 minutes but not necessarily to an increase in labour productivity. On the one hand, the negotiation of amendments has the effect of decoupling actual results from the awarding of the bonus, as Figure 5.7 shows. Bonus payments have remained fairly stable, always close to the maximum, when compared with the evolution of the various indicators determining them. On the other hand, the DEC, which was initially supposed to be a rule to be applied on the basis of team results, gradually became a negotiable rule. It is the product of a battle of wills between the production manager and the team supervisor. This aspect of the diagnosis will be verified in the other teams.

EK3: from maximization of WOUs to the forward-looking management of debt sheets

Favourable results and maximum bonus payments

EK3 operatives have always obtained the maximum bonus, which reflects the generally positive results they recorded between April 1993 and October 2000. The annual rate of growth in labour productivity is +3.8 per cent, while debts and fault recurrence rates declined at a rate of –18.9 per cent and –4.3 per cent per annum respectively, as Figure 5.8 shows.

Even before the introduction of the DEC, EK3's labour productivity was very high. In 1991, average working time was estimated at 6.39 hours, whereas the 'standard' working time equating to the output

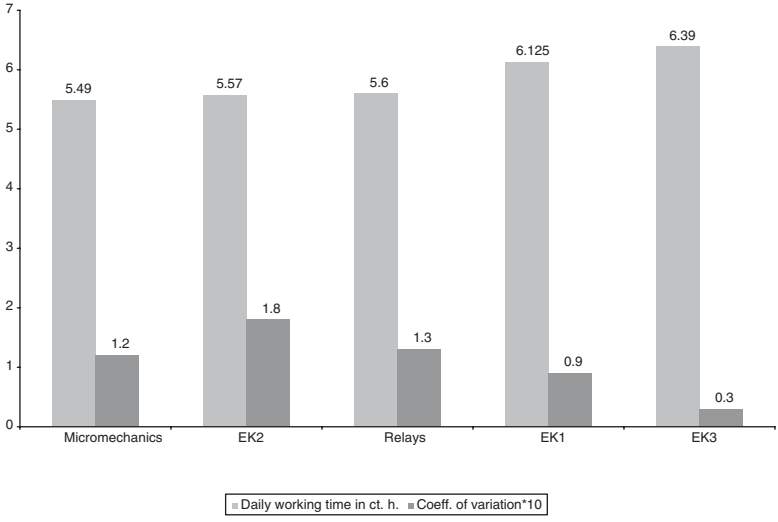


Source: Author's calculation from the AME data.

Figure 5.8 EK3: Evolution of labour productivity, debt levels and fault recurrence rates, 1993–2000

required for payment of the maximum bonus was 6.50 hours (Figure 9).[16] In concrete terms, the operatives had to improve their daily productive effort of 0.11 hours, or about six minutes, in order to obtain 7,000 francs, assuming that the other indicators used to calculate bonus payments were at the maximum level required. Moreover, disparities in working time within the team were low, as is shown by the coefficient of variation for individual working times (0.03 – see Figure 9). This is an indication of a high degree of cohesion within the team, a characteristic that encourages high labour productivity.

However, these apparently favourable factors do not constitute a guarantee that the maximum bonus will be received over a period of eight years. In order to reconstitute the team's strategies, we need to compare various data, as we did in the case of EK1. Thus statistical analysis, changes to the rules governing the bonus scheme, and in particular changes to the standards for debt levels and fault recurrence rates through the negotiation of amendments to team contracts, together with the management style of the various supervisors who succeeded each other at the head of the team, all have to be taken into account.



Source: Author's calculation from the AME data.

Figure 5.9 Estimation of daily working time per operative and coefficient of variation for individual working times, 1991

Examination of these various elements over the period 1993–2000 reveals a discontinuity in April 1996. On the one hand, this month marked the first time maximum labour productivity was achieved and the last time the maximum fault recurrence rate was recorded. On the other hand, the whole set of rules governing the DEC was beginning to change; in particular, the first amendment to the team contract, the only legal mechanism for modifying the rules governing thresholds, scales and coefficients, was signed in May 1996.[17] Incidentally, EK3 was the only team not to have negotiated an amendment to its contract before 1996.

In reality, closer examination of the content of the amendments shows that the real break occurred in April 1997, since it was from this point onwards that the nature of the amendments began to change following the arrival of a new supervisor. This is why we hypothesize that a shift in strategy occurred in the second quarter of 1997. Table 5.3 summarizes the differences in the evolution of the relevant indicators in the various sub-periods.

Table 5.3 EK3: Rates of growth in labour productivity, debt levels and fault recurrence rates, 1993–2000

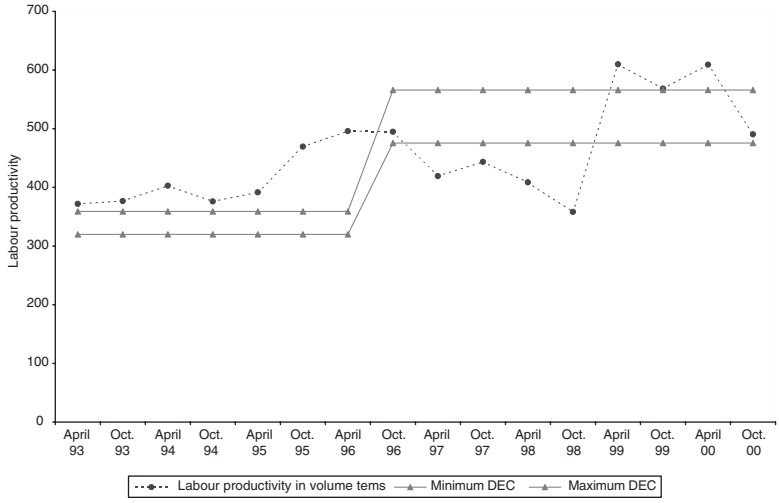
Annual rate of productivity growth (April 93–Oct. 00)	+3.8	Annual rate of productivity growth (April 93–April 1997)	+3.1	Annual rate of productivity growth (April 97–Oct. 00)	+4.6
Annual rate of growth in debt levels (April 93–Oct. 00)	–18.9	Annual rate of growth in debt levels (April 93–April 1997)	–0.25	Annual rate of growth in debt levels (April 97–Oct. 00)	–35.9
Annual rate of growth in the fault recurrence rate (April 93–Oct. 00)	–4.3	Annual rate of growth in the fault recurrence rate (April 93–April 1997)	–19.5	Annual rate of growth in the fault recurrence rate (April 1997–Oct. 00)	+16.6

Source: Author's calculation from the AME data.

Maximizing the 'weighted output units', 1993–97

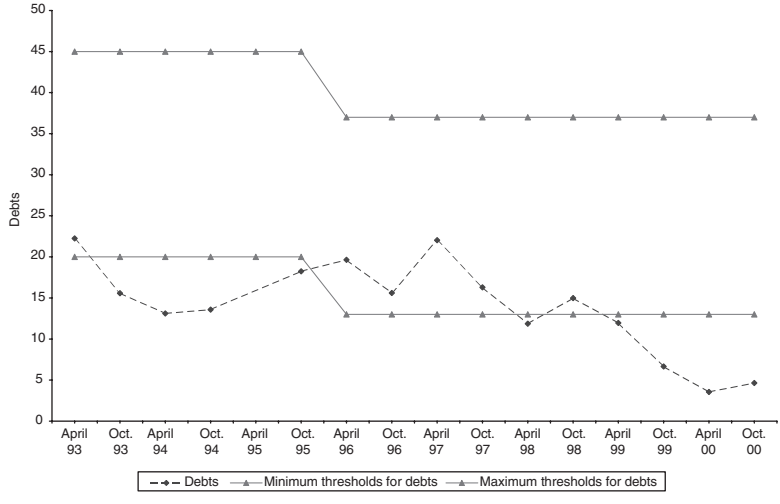
During this period, there was sustained growth in labour productivity (+3.1 per cent) and a very slight decrease in debt levels (–0.25 per cent). The marked reduction in the fault recurrence rate (–19.5 per cent) was concentrated into a period of a few months (September 1996–April 1997) and was not sustained beyond that period. However, this rate is very much higher than the level required to obtain the maximum grade (cf. Annex C-6). In reality, labour productivity and debt levels deteriorated over the last six months of this sub-period (October 1996–April 1997), falling below the minimum and maximum DEC thresholds respectively (Figures 5.10 and 5.11). This deterioration reveals the limits of a policy of maximizing the 'weighted output units'.

At the beginning of the period, when debt levels were declining, productivity was rising slowly; subsequently, the converse was the case. It would seem, therefore, that the operatives were not *continuously* adhering to the priorities imposed by the *debt sheets*, otherwise debt levels would have declined significantly as labour productivity rose. The operatives selected those procedures that minimized the time spent on each repair, in such a way as to maximise output. They gave priority to the easiest producers, those that generated the



Source: Author's calculation from the AME data.

Figure 5.10 EK3: Evolution of labour productivity and the minimum and maximum DEC thresholds



Source: Author's calculation from the AME data.

Figure 5.11 EK3: Evolution of debt levels and of the minimum and maximum DEC thresholds

most 'weighted output units': individual circuit boards rather than whole units, and so on.[18] This strategy was a rational one. On the one hand, the productive effort required was minimal – the team was only 1.7 per cent short of the output figure required for payment of the maximum bonus. On the other hand, if the team's output figures exceeded the threshold that triggered the maximum payment, any excess could be carried over to the following period, which was not the case with debts and fault recurrence rates.[19]

It was probably in order to encourage operatives to take action to reduce debt levels that it was decided in February 1996, as management and team supervisors were engaged in the triennial review of the DEC contracts, to apply new, much higher weighting coefficient.[20] These coefficients were applied retrospectively, with effect from May 1995, which enabled the team to exceed the output level triggering the maximum bonus payment while at the same time working to reduce debt levels; some of the parts in question had to undergo *reconditioning* or *general overhaul*, which increased procedure times.

A shift in strategy: revisions of the rules and the introduction of conditional rules, 1997–2000

The second phase, which lasted from April 1997 until October 2000, saw the emergence of two new characteristics, namely a decline in debt levels (–35.9 per cent per annum) and a new policy on amendments. Under the influence of a new supervisor, the purpose of the amendments underwent radical change. In contrast to the first two amendments concluded on 9 May 1996 and 17 April 1997, the next five amendments anticipated a future difficulty by introducing rules that were conditional on a particular event, usually relating to the availability of a missing component. The supply problems that began to make themselves felt from 1996 onwards stemmed from the fact that suppliers were working on a just-in-time basis, which extended delivery times from four to six months.[21] The change the supervisor introduced was a fundamental one. Unlike decisions, whose effects make themselves felt in a specific and different way each time and are exhausted once enacted, rules modify the context within which work is organized and the conditions under which the bonus is obtained, thereby opening up a space within which choices can be made.

The aim of the new policy on amendments was to prevent operatives being penalized for organizational shortcomings for which

they were not responsible. However, it does not explain the extent to which debt levels declined. At the same time, the supervisor required the operatives to give priority to clients' needs, and in particular to the *debt sheet*, rather than to easy procedures. Finally, he put in place a *predictive maintenance system* based on a detailed analysis of the history of each unit sent for corrective maintenance. As a result, components were replaced before they failed. The data on the damage to each unit gathered in this way could also be used to predict, to some extent, future demand for components so that they could be ordered in advance.

Thus the supervisor's strategy created the conditions under which labour productivity could continue to rise and debt levels could be reduced. Incidentally, there was a negative correlation during this period between labour productivity and debt levels: the R^2 was 0.21, with a significant coefficient (Annex C-7a).

However, in the midst of all these efforts to strike a balance between the rules on quantity and those on quality, the operatives also perhaps managed to extricate themselves from the situation fairly well by concentrating on the debts that were easier to discharge, that is the *non-recurrent faults*, while at the same time fulfilling their responsibilities in respect of the *debt sheet*. Maximizing the productivity bonus was still compatible, if only in the short term, with satisfying client demand. This would be one possible explanation for the negative correlation between debt levels and fault recurrence rates during this period; the R^2 was 0.36, while the sign for the fault recurrence rates is negative (cf. Annex C-7b).

This team adopted a somewhat different strategy from that adopted by EK1. The maximum bonus can never be obtained by recourse to just a single strategy, since each one comes up against the limits imposed by the DEC rule system. The strategy of maximizing labour productivity by concentrating on procedures that take little time comes into conflict with the rule imposed by the debt sheet and telephone calls from the line operators. There was a shift of strategy in order to give priority to clients' needs while at the same time maximizing the productivity bonus, the solution being to concentrate on *debts caused by non-recurrent faults*. The most effective way of achieving the maximum bonus seems to be to find the correct balance between the constraints imposed by the various rules. The supervisor was also obliged to engage in these manoeu-

vres with the rules. First, in return for the action on debt reduction, he managed to obtain changes to the rules governing the three possible levers: the output weighting coefficient and revisions of the debt schedules and of the fault recurrence rates. Secondly, he innovated by introducing conditional rules. However, the opportunity to make these changes depended to a large extent on the balance of power between the production manager and the supervisor, and on the latter's credibility. It would seem, therefore, that the team's results reflect a balance between the various rules.

The micromechanics team: guaranteeing 50 per cent of the maximum bonus

Recovery from a critical situation

Of all the teams, it was the micromechanics team that progressed most during the period in question; however, it was also the one that had been in the most difficult situation in the period 1991–92, just before the introduction of the DEC.

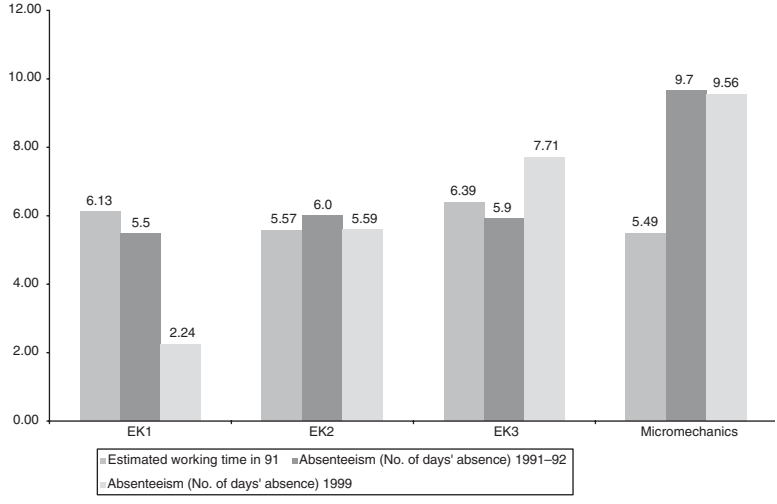
All three indicators used to calculate the productivity bonus evolved very positively, making the micromechanics team the best in terms of productivity gains (+7.3 per cent per annum) and improvements in work quality: debt levels and the fault recurrence rate declined by – 7.2 per cent and –23 per cent per annum respectively, as Table 5.4 shows.

Table 5.4 Rate of increase in productivity, debt levels and the fault recurrence rate for the teams and AME as a whole, 1993–2000

	EK1	*EK2*	*EK3*	*EK4**	*Micromechanics*	*AME*[22]
Annual rate of productivity growth	–3.65	+0.31	+3.76	–2.82	+7.79	+2.84
Annual rate of growth in debt levels	–9.39	+14.55	–19.36	+30.15	–6.51	+0.40
Annual rate of growth in the fault recurrence rate	–14.21	–5.57	–4.29	+14.03	–21.68	–12.01

Note: *EK4 has been in existence only since October 1996.
Source: Author's calculation from the AME data.

However, the team's progress has to be assessed relative to its initial situation, which in terms of productivity, work quality and employee involvement was particularly critical. First, the micromechanics teams was the one which, on average, had to make the most significant productive effort, since its output figures were no less than 18.5 per cent below the maximum DEC threshold, as Figure 5.9 shows.[23] Secondly, as far back as November 1992, the team's debt levels were extremely high: 125 is a record for the period in question (November 1992–October 2000). This is more than 12 times the debt level (10) that makes teams eligible for the maximum monthly internal quality mark used in calculating the bonus payment.[24] Finally, the level of employee involvement was low. According to the estimates based on the snapshot observations conducted in 1991, actual working time was 5.49 hours, the lowest of all the teams, compared with a standard working time of 6.50 hours. Moreover, absenteeism, measured in terms of the number of days' absence per year due to sickness, was the highest of all the teams, at 9.7 days (Figure 5.12). Incidentally, there was a negative relation-



Source: Author's calculation from the AME data.

Figure 5.12 Estimated working time in 1991, average absenteeism in 1991–92[25] and in 1999

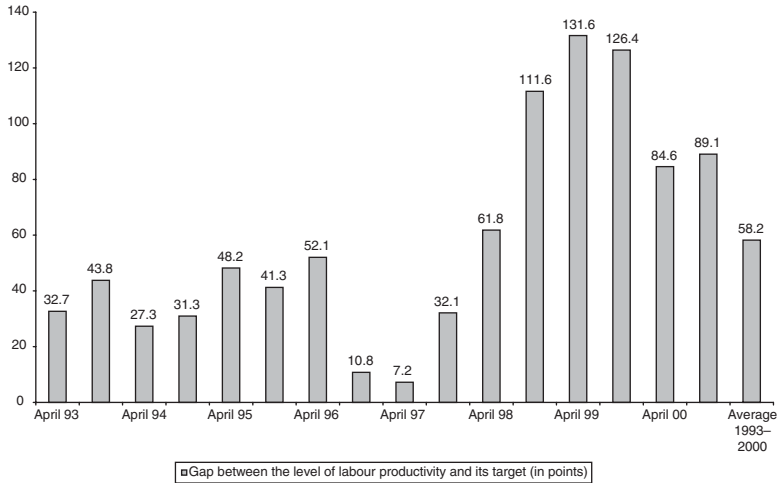
ship between actual working time and absenteeism in this team, although it is not possible to infer any correlation between these two variables. The industrial relations climate in this team was undoubtedly difficult, no doubt because of the prospect that most of the operatives, all of whom were clockmakers by trade, would have to retrain as electronics specialists. The micromechanics team was employed to repair the clockwork-driven devices used on the Metro (black boxes, tachographs, etc.), and as early as 1991 it was already known that this equipment was to be replaced by electronic devices.

It should be made clear that the micromechanics team is actually engaged in two separate activities: micromechanics in the strict sense of the term and the electronic aspects of clockwork-driven machinery. Micromechanics accounts for by far the larger share of the team's activities: 89.4 per cent of the WOUs produced on average over the period between November 1992 and October 2000, 91 per cent of debts in April 1995[26] and 95 per cent in October 2000. The average fault recurrence rate for the micromechanics section (4 per cent) is very comparable to that of the team as a whole (3.9 per cent). Calculation of the coefficients of correlation between the team variables and those of the micromechanics section on the basis of the monthly data for the period in question indicates that the structure of the team as a whole is determined by the weight of the micromechanics section. The regression between the team's fault recurrent rate and that of the micromechanics section is high (R^2=0.73). The same applies to debt levels (R^2=0.99) and productivity (R^2=0.92). The full figures are given in Annex C-8. This is why, in the rest of this section, the team's micromechanical activities are focused on.

Guaranteeing 50 per cent of the DEC through overestimated weighting coefficients

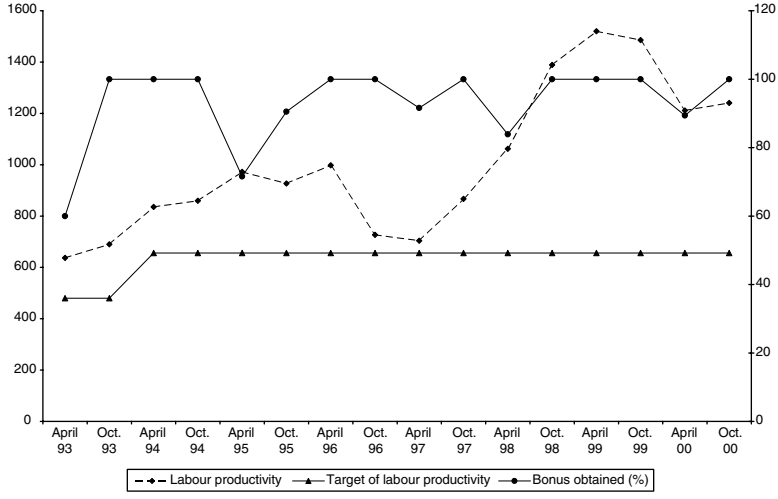
One of the specific characteristics of the micromechanics team, one that is not encountered anywhere else, is that its productivity is well in excess of that required to obtain the maximum bonus, as Figure 5.13 shows.

When the DEC was introduced, in April 1993, this gap, known as the productivity margin, was 32.7 per cent. By April 1999, it had reached 132 per cent. The average productivity margin was 58.2 per cent, despite the decrease in the weighting coefficients, to which we will return. Thus the evolution of labour productivity



Source: Author's calculation from the AME data.

Figure 5.13 The micromechanics team and its productivity margin (%)



Source: Author's calculation from the AME data.

Figure 5.14 The micromechanics team: evolution of productivity relative to the maximum DEC threshold

(measured in volume terms – see Figure 5.14) was such that the team always obtained the 50 per cent of the productivity bonus paid in respect of output.

Undoubtedly, therefore, the micromechanics team made sure it was paid 50 per cent of the maximum bonus by negotiating very high weighting coefficients, for both corrective and preventive maintenance work. When the productivity bonus scheme was introduced, they were 2.5 and 13 respectively; in concrete terms, this means that a preventive procedure generates 13 WOUs or 13 hours' work. As we have already noted, the purpose of the weighting coefficient is to make all procedures comparable and to make one WOU equivalent to one hour's work (cf. Annex C-10: Evolution of the weighting coefficients).

In reality, these coefficients, and those that were applied subsequently, are overestimated. This can be demonstrated by comparing the average number of hours per corrective or preventive procedures, as declared each month by the supervisor, with the weighting coefficient. The results are shown in Table 5.5.

For the six years in question here, the average time per preventive procedure (column 3) is considerably less than the theoretical time produced by applying the coefficient, despite its reduction in

Table 5.5 Operatives' time savings per type of micromechanical procedure, 1995–2000

	Average actual time/ procedure		*Estimated times: coefficients applied*		*Difference between estimated time and actual time per procedure*	
	Average hours per corrective procedure	*Average hours per preventive procedure*	*Corrective coefficient*	*Preventive coefficient*	*Time saved per corrective procedure*	*Time saved per preventive procedure*
1995[27]	2.09	6.96	2.5	13	+0.41	+6.04
1996[28]	2.11	6.59	2.5	13	+0.39	+6.41
1997	1.64	5.58	1.419	10.361	–0.22	+4.78
1998	1.67	3.55	1.419	10.361	–0.25	+6.81
1999[29]	1.55	3.18	1.419	10.361	–0.13	+7.18
2000	1.45	2.88	1.118	6.482	–0.33	+3.60

Source: Author's calculation from the AME data.

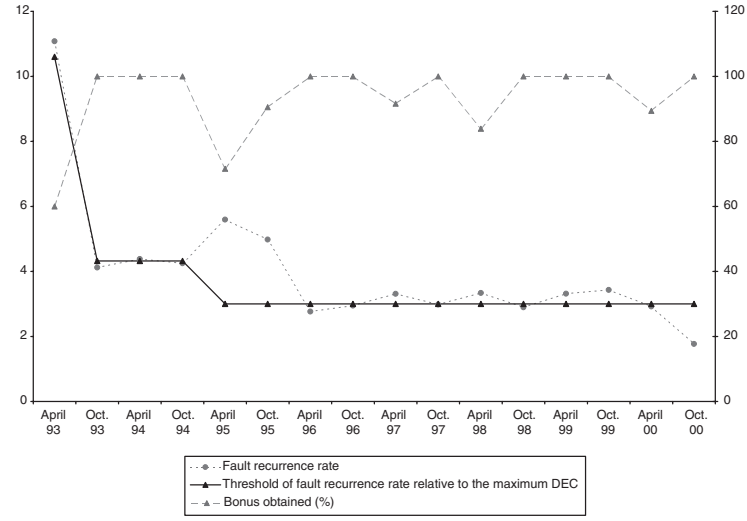
two successive amendments. Thus the time saved per preventive procedure in 1995 was 6.04 hours or 6.04 WOUs. In the case of corrective procedures, the coefficient tends to be somewhat underestimated (column 6). This is of relatively little importance, since about 85 per cent of the team's work, in terms of the number of procedures, consists of preventive procedures. This overestimation of the coefficients explains why an increase in productivity does nothing to reduce debt levels; this is reflected in statistical terms by the lack of correlation between the two variables.

The micromechanics team is a good illustration of the notion that productivity is a social and collective construction. It is likely that, when the first DEC contract was signed in 1992, the balance of power lay in the team's favour.

The maximum bonus as a reward for relative rather than absolute results

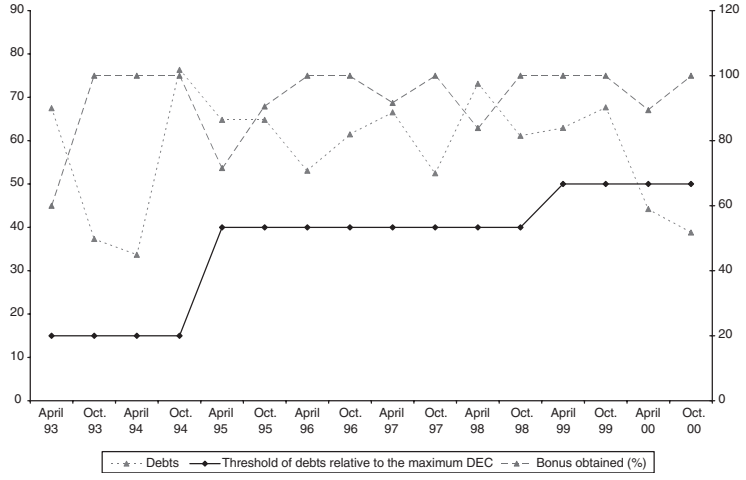
The following two diagrams show the evolution of the fault recurrence rate and debt levels. The level of fault recurrence (and of debts) corresponding to the maximum score required for payment of the maximum bonus has been plotted for each variable. These diagrams show the gap between the team's performance and the maximum target. The fault recurrence rate, which was indifferent in April 1993, fairly quickly reached the level equating to the maximum score; on two occasions (in April 1993 and April 1995), it was this rate that explained why the team failed to obtain the maximum bonus (Figure 5.15).

The operatives obtained the maximum bonus when they showed they had made an effort, particularly to improve debt levels, and not when they reached the absolute level required. On virtually every occasion, that is with the exception of the April 1993 and April 1995 payments, the team received the full bonus when the level of debt declined; conversely, the team obtained less than the maximum bonus whenever the debt level worsened. However, on no occasion did the team reach the minimum debt level required. This clearly shows that interpretation of the DEC varies according to the relations established between the supervisor and the production manager and each team's economic history (its initial level and its specific difficulties). In the case of the micromechanics team, it



Source: Author's calculation from the AME data.

Figure 5.15 The micromechanics team: evolution of the fault recurrence rate relative to the maximum DEC threshold



Source: Author's calculation from the AME data.

Figure 5.16 The micromechanics team: the evolution of debt levels relative to the maximum DEC threshold

would seem that account was taken in managing the bonus scheme of the need to retrain operatives in electronics and of the deterioration in the industrial relations climate arising out of the clockmakers' attachment to their trade. As far as the micromechanics team is concerned, the DEC can be said to be an instrument for improving the performance of a team in difficulty; it functions well as an incentive mechanism while at the same being sufficiently flexible for specific economic and industrial relations constraints to be taken into account.

Conclusion

At the heart of this chapter lies the notion that there is no sense in seeking to explain how rules operate without at the same time investigating how individuals or groups act upon them. Three conclusions can be drawn from a comparison of the teams' performance as measured in statistical terms with the amendments to the team contracts, the triennial reviews of the contracts and the percentage of the bonus obtained. First, there is dissociation between productivity gains and payment of the bonus, since operatives can obtain the maximum payment without their productivity figures being at the required level. Secondly, the DEC productivity bonus scheme has not fulfilled all the objectives its advocates were initially seeking, since there has been a marked slowdown in labour productivity growth since 1992, although it cannot be proved that the introduction of the DEC is one of the reasons for this. Thirdly, the teams adopted different strategies in order to maximise their bonus payments.

The first finding – that of dissociation between the teams' actual performance and payment of the maximum bonus – means that *labour productivity is the result of a collectively formulated plan*. This policy started in November 1994 at the time of the dispute within team EK1. In retrospect, it would seem that it was the first step towards a *social approach to the management* of the DEC bonus scheme, an approach that that spread gradually and unevenly within the AME over the course of the following year. A proliferation of amendments to team contracts and changes to the weighting coefficients are the main instruments used in this social management of the DEC, even though the latter were conceived

and deployed as a means of preventing teams from being penalized by exogenous shocks for which operatives are not themselves responsible (technical problems, difficulties in obtaining the components required for repairs, and so on). Thus the supervisors use the results produced by application of the rules as a basis for renegotiating their teams' contracts and putting forward amendments of their own. Among the variables that are the object of negotiation, the one that directly affects productivity levels (upwards or downwards) is the weighting coefficient. In effect, the level of the coefficient depends on the supervisor's ability to justify his request for change, and hence on the balance of power between management and supervisor. This brings us to the second finding.

To state, as we have done, that productivity is a construct does not mean that it might be arbitrary. We cannot embark here on an exhaustive analysis of the determinants of labour productivity, but it would appear that one factor in particular has played an important role in the slowdown in productivity since 1992. This is the contradiction, most evident in the performance of EK1, between the DEC's quantitative and qualitative targets. We have argued that this contradiction explains the decline in this team's productivity (–6 per cent per annum between 1992 and 1995). In the case of the relays team, the collapse of its labour productivity (–9.8 per cent per annum) seems due to ideological reservations about the notion of productivity gains, which allegedly create unemployment. From a statistical point of view, these two poor results are sufficient to explain the stagnation of productivity in the AME during this period (+1.2 per cent per annum), given the disproportionate weight of these two teams within the workshop as a whole (cf. Annex C-11).

And now to the third finding. In their attempts to maximize bonus payments, the teams adopted different strategies. This is reflected in differences in their performance in respect of productivity gains, improvements in work quality and group dynamics. It is this finding that persuades us to contradict the majority of economists and argue that the same rule produces non-identical effects. This finding undermines the hypothesis that, by virtue of their homogenizing effect on behaviour, rules are one of the possible bridges between the micro and macroeconomic levels. We have shown that, on the contrary, the DEC and the rule system of which it is part produce heterogeneity. There is one fundamental reason

for this, namely that the operatives make specific choices, taking into account factors such as their work organization habits, the strength of their involvement in their work, the degree of cohesion within the group, the amount of shared knowledge and their relations with the team supervisor. This latter also has a strategy to implement, based on his approach to managing the productivity bonus scheme. All this, and many other aspects as well, can be summarized in the term 'team style'. This 'style' exists only as a collective phenomenon and cannot be reduced to individual behaviours or characteristics. The rules have different effects depending on the characteristics of the groups to which they are applied. This shows clearly that the knowledge held by those at whom rules are directed is an essential factor that economists should take into account in evaluating the consequences of rules once they are applied.

The rules governing the bonus scheme produce heterogeneity in those situations in which incentive theory assumes homogeneity of behaviour and strategy. Moreover, the thresholds and coefficients changed in the course of the period under investigation. Clearly, therefore, we can say that the DEC is in a state of constant evolution but not that the rule in question is no longer the same rule. This characteristic of rules is not taken into account in models of incentive systems.

Taken as a whole, these findins show that, while individuals may follow a set of rules (Chapter 4), they also act according to the rules, to adopt a distinction drawn by Evelyne Serverin (2000).[30] In this case, '*acting according to the rules*' means that supervisors and management engage in the task of interpreting past results as well as the conditions under which results can be obtained in future. This exercise in interpretation finds its concrete form in the bargaining process. The purpose of such an exercise varies from team to team. In his *Essay on the Theory of Science*, Max Weber[31] (1922: 324) saw this as the reason for the diversity of outcomes produced by the same rule:

> The meaning of an established rule or regulation, and hence the specific activity that an individual sets himself to undertake, as well as that he expects of others, may have been understood and interpreted subsequently in different ways by each of the socialized individuals, in such a way that an activity that appears sub-

jectively to be guided by a rule of regulation (to which the members subjectively attribute what they believe to be an identical meaning) does not necessarily lead, in identical situations, to an objectively similar activity.

Chapter 6 draws together the lessons of the various empirical analyses with a view to developing a practical theory of rules based essentially on the links between rules, routines and *habitus*.

6
Rules, Routines and *Habitus*

A number of answers to the question of how rules operate have emerged in the course of the book, some of them only briefly alluded to. In this chapter, it is attempted to put those answers into a broader context. The reasons why the mechanistic concept of rules adopted by most economists is rejected is outlined first. Then the idea that a different concept of rules is put forward, one in which they are regarded as statements in need of interpretation, is possible. The interpretation of rules requires the presence of active individuals who, endowed with certain dispositions and characterized by a certain style or *habitus*, follow or infringe the rules, make them subjects for negotiation and thereby transform them. In the final part of the chapter it is also shown that the meaning of a rule lies in its uses, rather than the other way round.

A critique of the mechanistic concept of rules

Those economists who take a mechanistic view of rules are also adopting a functionalist approach, in which rules are assumed to produce their effects because of the function assigned to them. From this perspective, the question of how rules operate is irrelevant, since the entire answer is contained within the definition of the rule, which is given at the outset. For example, for rational choice theorists, rules are constrains on maximization in pursuit of self-interest. For cognitivist economists, rules have a cognitive function, and so on. Thus a constant stream of qualifiers, which change according to academic fashion and the problems under investiga-

tion, is attributed to the functions of rules, which thereby acquire all possible virtues: constraint, coordination, incentive, cognition. This concept of rules raises a number of difficulties, which we outline below.

The first difficulty is this. How can rules fulfil whatever function theorists want them to fulfil unless account is taken of the social context that determines how they are put into practice? Let us take one of the efficiency wage models that of Shapiro and Stiglitz (1984) already outlined in Chapter 1 (p. 19), which shows that the threat of dismissal is an effective way of flushing out shirkers. By including nothing other than the dismissal rule in their model, Shapiro and Stiglitz take the view that a rule can operate in isolation merely by virtue of its existence. With the exception of unemployment, which contributes to the credibility of the dismissal threat, the authors perceive only the visible tip of the iceberg. In doing so, they ignore all the others social, cultural, institutional and political conditions required for such a rule to be applied. In the industrialized countries, legislation on dismissals is part of a legal system that is itself based on the political institutions that enacted the legislation and are charged with the task of enforcing it. At firm level, finally, the decision to dismiss depends not only on the various institutional systems (the law, collective agreements) to which firms are subject but also on their management culture and on an assessment of the costs and benefits of a dismissal.[1]

The second difficulty is that a mechanistic approach to rules is not compatible with the possibility of 'unintentional effects', a phenomenon that economists themselves recognize. In judging these effects, they rely on an unambiguous concept of rules and on the notion they have of themselves and of others (those to whom the rules are applied), believing themselves all-powerful because they do not consider the possibility that rules might produce different effects from those they envisage. Of course, merely to acknowledge the possibility of unintentional effects is to admit the inadequacy of a mechanistic concept of rules. Nevertheless, such concepts go largely unchallenged. Thus incentive theorists (Gibbons, 1998; Holmström and Milgrom, 1994) seek to establish what the optimal pay rules might be in the light of the informational asymmetries between employers and employees. The rule thus formulated is applied everywhere in the same way in

an improbably perfect world that bears no resemblance at all to the real social world. In this idealized world, individuals are identical and theorists endow them, a priori, with a certain psychology (opportunistic, 'free-rider', hyper-rational, and so on). They all interpret the rule in the same way. Stiglitz (1975) was one of the first to develop this type of model, in which the recommended pay rules themselves dispose of the problem of how they are to be interpreted.

The third difficulty is that a mechanistic approach to rules ignores the fact that each rule is always part of a rule system. This has two fundamental consequences. First, actors develop their strategies on the basis of the rule system as a whole and not of a single rule. Thus the strategies deployed by the various teams in the RATP workshop in their attempts to maximize their productivity bonus payments differ in that each one prioritizes one of the rules over the others. One team exploits the rule on output weighting coefficients, while another, anticipating problems in the future, negotiates in advance an amendment that revises certain rules, and so on. Secondly, the rules are not always consistent with each other. A survey on pay rules carried out in 50 of the largest companies located in France (Reynaud and Najman, 1992) revealed that organizations are built on vast accumulations of rules, with those that become obsolete never being discarded and those currently in force not necessarily having any relation to each other. In fact, employees' total remuneration packages often result from the application of several compartmentalized rules, each of which determines one single aspect of total pay (basic salary, individual pay rises incorporated into the basic salary, individual bonuses, group incentive schemes and, for senior management, bonuses and stock options). It so happens that the various reference models to which these rules refer frequently contradict each other (some emphasizing the individual, others the group).

The fourth difficulty lies in the fact that, in the mechanistic approach, rules act in an *unique*, causal way on individuals who enjoy absolutely no room for manoeuvre, since the strategies individuals deploy when confronted with the rules, outlined in the models mentioned above (Stiglitz), are always foiled by the theorists. However, examples drawn from various areas show that this is not the case at all.

Let us take the introduction, at the end of the 19th century, of piece work,[2] the purpose of which was to give workers an incentive to increase productivity. However, the incentive function of this wage form was only partially realized, since workers rightly feared that production targets would be raised and, when the norms were being established, reacted by '*going slow*' (Coriat, 1979) or, in Taylor's words (1911: 32–33):

> systematically soldiering … [which] is done by the men with the deliberate object of keeping their employers ignorant of how fast work can be done. Indeed, soldiering is so widespread that 'hardly a competent workman can be found in a large establishment … who does not devote a considerable part of his time to studying just how slowly he can work and still convince his employer that he is going at a good pace.

The so-called Aubry laws on the reduction of working time in France (1998, 1999) are another example of rules that have fulfilled a different function from that stated by the government. Conceived as a means of encouraging firms to recruit more workers, the legislation on the 35-hour week has in fact led to increased work intensification, since firms have been reluctant to recruit new staff in order not to increase their wage bills and hence labour costs (Askénazy, 2001a, 2001b). The observed reduction in unemployment is the result partly of a windfall effect linked to the provisions of the legislation but mainly of an unexpected improvement in the economic situation.

Our work on the DEC team productivity bonus in the Paris Métro has revealed that teams of operatives that are in every other respect very comparable have adopted very different strategies in their attempts to maximize bonus payments. One team uses the DEC performance figures (labour productivity and work quality) as a bargaining chip through the systematic negotiation of amendments to the team contract. Another team anticipates future difficulties that might prevent operatives from obtaining the maximum bonus if an amendment relating to the future is not negotiated. A third team overestimated the weighting coefficients used when the bonus scheme was first introduced. In the first strategy decisions are invoked, while in the second the rules are

subject to revision. The third strategy exploits the informational asymmetry between operatives and management as to the actual working time required for preventive and corrective procedures (this strategy is all the easier to put into practice since the team in question maintains the speed recorders, a procedure that takes between 6 and 13 hours). These strategies have led to a gradual erosion of the link between actual labour productivity and receipt of the maximum bonus.

Amidst all these criticisms, it has to be remembered that, in the mechanistic approach, rules determine their effects causally because they operate in isolation and in the same way at all times, in the absence of any particular institutional conditions or individuals capable of devising winning strategies. The empirical study we have carried out in this book calls this idea into question: rules produce effects through the interpretations put upon them and the strategies to which they give rise in a given institutional context. Rules do not have any meaning in themselves; rather the meaning of rules lies in their uses. The DEC productivity bonus scheme, combined with all the other rules governing work in the RATP workshop, can be said to have transformed the notion of labour productivity, which has ceased to be an actually observed ratio (between the volume of output and actual working time) and has become a collective construct. Thus it was long after its introduction that the DEC acquired its meaning through the usages and practices of the individual teams and of management. Our research hypothesis, which draws heavily on Wittgenstein's treatment of rule-following, has found solid support in reality.

In the light of our findings, we can return to Wittgenstein's hypothesis on rules,[3] which is in fact more complex than suggested by the outline of it in the introduction to the book. Let us take the example of the signpost, which Wittgenstein uses several times in PU (§85, §198):

> A rule stands there like a sign-post. – Does the sign-post leave no doubt open about the way I have to go? Does it show which direction I am to take when I have passed it; whether along the road or the footpath or cross-country? But where is it said which way I am to follow it; whether in the direction of its finger or (e.g.) in the opposite one? (Wittgenstein, PU §85).

Then, if one asks someone to explain the relationship between the signpost and one's own actions or the nature of the link between the two and that person answers:

> I have been trained to react to this sign in a particular way, and now I do so react to it.
>
> But that is only to give a causal connexion; to tell how it has come about that we now go by the sign-post; not what this going-by-the-sign really consists in. On the contrary; I have further indicated that a person goes by a sign-post only in so far as there exists a regular use of sign-posts, a custom (Wittgenstein, PU, §198).

Clearly, for Wittgenstein, there is no causal relation between a rule and its application. After all, for a cause to be established, it must be possible to have knowledge of the entire process leading to the action. In reality, we have to be satisfied with a likely reason rather than a cause (Bouveresse, 1971: 368). Between a rule and its application, there is a concordance or internal connection, rather than a causal relationship.

The interpretation of rules and the power of custom and practice

The properties of rules

From our point of view, which is shared by most legal experts,[4] such as Virally (1960), Carbonnier (1983) and de Béchillon (1997), *rules have two inseparable properties: generality and abstraction*. Indeed, a rule cannot be abstract unless it is general.[5] Mayer (1973) adds a third property: by virtue of its general nature, a rule is characterized by permanence over time. This property is what distinguishes rules from decisions.[6] However, it would be platitudinous merely to echo what legal specialists have been writing for a long time without going further and inferring *a fourth property* which, in our view, is essential because it is operational: *a rule is characterized by its distance from the solution*. A rule makes it possible to find the solution to a real problem but does not itself provide that solution. It is a framework that guides behaviour. Thus the DEC agreement, which lays down an algebraic formula

for labour productivity, certainly provides the means of finding a solution to the shortage of actual working time by setting quantitative and qualitative targets equating to the maximum DEC threshold. Scant attention is paid to how those targets are to be achieved.

However, in order to understand how rules produce their effects, it should be noted that the DEC is an evaluative instrument that has two dimensions: it is both *a standard and a reference model*.[7] The 'standard rule' is used to evaluate past performance: every six months, the position of each team in the AME is calculated relative to the maximum DEC threshold. The 'model rule' helps to determine future behaviour by establishing an ideal model that finds concrete expression in a norm that has to be attained.[8] Thus the DEC contains within itself the notion of exemplarity. Instead of influencing behaviour in a direct and authoritarian manner, the DEC encourages operatives to adopt a *certain type of behaviour* in order to produce work of the required quantity, quality and intensity. When it comes to the various possible strategies for maximizing bonus payments, the operatives really do have a certain degree of latitude in interpreting the rules. We will return to this point below (p. 129).

Let us take another example. In January 1914, when Ford introduced a high wage policy – $5 a day – in order to stabilize a workforce whose turnover rate had reached 370 per cent in December 1913 (Raff, 1988; Boyer and Orléan, 1991: 251), he also had a paternalistic objective in mind, namely a desire to normalize the working class: 'We want particularly to make men and not just automobiles', an objective he sometimes denied (Ford, 1922: 146): 'Nothing paternal was intended! – a certain amount of paternalism did develop …'. This is clearly illustrated by the granting of a share in the company's profits to workers with a minimum of six months' seniority and a clearly defined family status (Ford, 1922):

(1) Married men living with and taking good care of their families.
(2) Single men over twenty-two years of age who are of proved thrifty habits.
(3) Young men under twenty-two years of age, and women who are the sole support of some next of kin.

This fourth property – the gap between rule and solution – is coextensive with the incompleteness of rules. One of the consequences of this gap is that it is necessary, in applying a rule, to refer to other rules which, being themselves incomplete, require interpretation. The task of interpretation undertaken by the operatives was outlined when the rule system governing work in the AME was described. Those operatives wishing to receive the bonus also have to take account of the rules of work organization *(debt sheets, scheduling of major services)*, of the rules governing repair procedures, which are based on the RATP's reference manual, and so on. Each of these rules has to be interpreted by comparing it with certain stocks of knowledge: some of those stocks of knowledge are contained within others rules, others are stores of tacit knowledge held by the operatives. Under such conditions, *no rule can strictly govern behaviour*. It would also seem that the very task of interpreting rules brings into play knowledge, which, as a result, remains *living knowledge*. The task of interpretation takes place not in a vacuum but in the gap between rule and solution.

Let us take the rule that one should 'pay one's taxes'. It is incomplete in the sense that, before it can be applied, it requires knowledge and information that are not stored within the rule itself but in other rules produced by institutions. For example, a distinction has to be made between salary (or wages) and fees; the former are paid under the terms of an employment contract governed, in France, by labour law, while the latter are governed by civil law. Problems of interpretation arise most frequently in hybrid situations, such as when an employee also earns fees. Employees have to distinguish gross income from net income, a distinction that reflects the existence of institutions such as social security, health, unemployment and old age insurance, and so on. Thus we can say that 'paying one's taxes' has a meaning because of the existence of a state institution that has established a taxation system with its own rules.

The incompleteness of rules gives rise to a fifth property: rules are always rules in need of interpretation. We saw this in some detail when the AME management applied the snapshot observation method, a tightly drawn rule that appears for all the world to be a 'ready-to-use rule', in order to measure operatives' actual working time. In reality, it was interpreted. Each team supervisor went about making the snapshot observations as he saw fit ('guesstimates', calculations

adjusted to take account of the supervisor's judgement), the aim being to conclude one stage of the negotiations in order to proceed to the next one (Chapter 3).

However, another type of difficulty emerges when the aim is to introduce a negative rule, which by limiting the range of possible behaviours, may lead to radical indeterminacy, as in the case of the prohibition on indexing wages to past prices. How can the need to interpret this rule be reconciled with the obligation to make it into an operational rule? In Chapter 2, which examined wage disindexation in France in the 1980s, we argued that these two constraints could be resolved by formulating rules with thresholds, defined within an interval. However, the difficulty lies in the institutional construction of the thresholds. We recounted the immense effort the government made to shape both the rules and the institutions in such a way as to ensure adoption of a maximum threshold that would encourage the social actors to negotiate.

Rules cannot regress to infinity: 'usage is irreducible'

In Chapter 4 in particular, attention was drawn to the fact that part of the 'interpretative' activity involves reference to other rules, which as a result, form a system. Some of these rules do not have the same status as the others, since they define the conditions under which the rule to be followed is applied. Does the incompleteness of rules, their very indeterminacy, not cause them to regress to infinity? The same type of problem arises when a new rule is invented. No rule is created from nothing, without reference to custom and practice, observed averages and so on, otherwise it would be constantly invalidated by the practices currently in force. On the other hand, rules cannot be reduced to a mere transcript of existing usage, since their role is to guide future behaviour. They must be defined therefore, by reference to an ideal model, which cannot be divorced from current practice either otherwise it will simply go unheeded.

Taking Taylor's differential piece work as an example, we show that the hypothesis that rules can regress to infinity is untenable, since it comes up against the power of usages. This wage form is based on an assessment of the exact time allowed for each task. In Taylor's view, therefore, it was the work rate of the average worker that had to be measured. The difficulty is that, in reality, the average

worker does not exist. The work rate of this non-existent average worker can only be measured indirectly, by means of a rule. This rule defines the average work rate, taking that of the excellent worker as a starting point, to which Taylor (1911: 168) applies a standard deduction:

> Perhaps the greatest difficulty rests upon the fact that no two men work at exactly the same speed. The writer has found it best to take his time observations on first-class men only, when they can be found; and these men should be timed when working at their best. Having obtained the best time of a first-class man, it is a simple matter to determine the percentage which on average he will fall short of this maximum.

How is this deduction rule applied? The answer is *on the basis of the ratefixer's subjective judgement*. Taylor or Brown's description of ratefixing has become a byword for the intractability of this problem. Brown (1962: 29–33) devotes a whole chapter to 'The inaccuracy of ratefixing': '… neither piecework prices nor time allowances are the result of *measurement* … both result from the use of *judgement* by ratefixers'. He defines what measurement is: 'Measurement is the process of ordering data or observations to a scale of length by means of objectively definable operations. Measurement is not to be confused with guessing, counting, appraisal, evaluation or assessment.' If, however, the ratefixer supplements his measurement with:

> his *assessment* as to whether the individual timed is working at normal pace and, on the basis of that measurement and that assessment, he states a time target in units of minutes, he has *not* produced that target by measurement. … Ratefixers can measure the time which physical work takes to perform with a high degree of consistency … but they are measuring one aspect of work; its physical manifestations, which can be observed with the eye. They are not measuring the degree of responsible judgement shown by an operator in doing work.

Brown emphasizes the intuition the ratefixer requires in order to ascertain whether an operative is working at a normal pace and to

assess his physical and mental concentration. The risk is that the average observed by the ratefixer merely reflects the minimum work rate required to complete a given task, since workers are likely to be indulging in 'systematic soldiering'. In order to minimize this risk, the ratefixer has recourse to a 'coefficient of reduction'. This is not an explicit rule, enshrined in some written document. The coefficient that is selected is the result of the ratefixer's past experience and of his knowledge of current practices in respect of work rates.

This example demonstrates that rule-following does not lead to a regression to infinity since the rule is applied in 'a form of life'[9] and in a context shaped by custom and practice. As Bouveresse (1976: 551) writes, 'the notion of usage is irreducible'.

'Rule-following' and the construction of strategies for applying rules

Routines as interpreted rules

It was demonstrated in Chapter 4 that following the rules that make task selection possible (the *debt sheet* and the *schedule for major services*) is a complex activity. There are two basic reasons why this is so. First, operatives have to translate these abstract rules into concrete reference points and add in what is not specified in the rules. To that end, they draw on a number of very different resources: explicit knowledge contained in other rules, tacit knowledge acquired through personal experience and that of other operatives about the state of the rolling stock, output levels and certain ways of carrying out repairs, information derived from the context and, finally, practices encapsulated in phrases such as: 'We don't look at the tag before taking the unit to be repaired' and 'we like to build up as much advance stock as possible'. Thus the repetition of certain patterns of behaviour, such as glancing at the shelves in order to assess debt levels, is an example of a routine: a gesture of which an operative is not really aware and which in reality is a rule that has already been subjected to interpretation. In this sense, we share the point of view expressed by Gersick and Hackman (1990: 69), two organizational theorists for whom, 'an habitual routine exists when a group repeatedly exhibits a functionally similar pattern of behaviour in a given stimulus situation without explicitly selecting it over

alternative ways of behaving.' This absence of choice is one of the characteristics of routines, one that is hardly ever noticed.

In our view, the first difference between rules and routines is that the former are *arrangements awaiting interpretation*, while the latter are *rules that have already been interpreted*. The second difference is that rules are *explicit* while routines are *implicit*. The third difference lies in the distinction between the theoretical and the *pragmatic*. Routines can be said to offer a *pragmatic and implicit solution* to a problem for which rules provide *a theoretical and implicit answer*. Thus in our observations, routines emerge as one of the ways of following rules. To force the point a little, we can say that is through routines that rules are able to operate.

Our approach to routines is quite different from that of evolutionary theorists, and in particular from Nelson and Winter, for whom routines are a 'catch-all' notion, as Winter himself recognizes (1986: 165):

> Nelson and I use the word *routine* as the generic term for a way of doing things. It is simultaneously the counterpart of a wide range of terms employed in everyday life and in various theoretical languages, including those of orthodox and behavioral economic theory; among these terms are decision, rule, technique, skill, standard operative procedure, management practice, policy, strategy, information system, information structure, program, script and organization form.

For Winter, however, there is a justification for denoting all these actions by the term 'routine', which is that they are all triggered by a small number of signals. Is this not a rather strange justification?

These unconscious behaviour patterns, particularly in task selection, make routines a powerful instrument for dispelling the uncertainty surrounding agents' intention to cooperate. *Routines make it possible to forget the Other*. Here again, we share the point of view expressed by Gersick and Hackman (1990: 71–2), for whom routines reduce the uncertainty and anxiety associated with group work by bringing a degree of predictability to it. When the function of routines is to dispel the relative doubt about the willingness of others to cooperate, they have the same meaning as the notion of *habitus*

developed by Bourdieu, who suggests, particularly in *Outline of a Theory of Practice* (1977: 80), that:

> One of the fundamental effects of the orchestration of *habitus* is the production of a commonsense world endowed with the objectivity secured by consensus on the meaning of practices of the word, in other words the harmonization of agents' experiences. … This practical comprehension obviates the 'intention' and 'intentional transfer into the Other' dear to the phenomenologists, by dispensing, for ordinary occasions of life, with close analysis of the nuances of another's practice and tacit inquiry ('What do you mean?') into his intentions.

Habitus and dispositions as the basis for strategies for applying rules

The work teams in the Electronic Equipment Maintenance Workshop have already been shown to be comparable, with some of them even having been split in two (EK1 and EK4). And yet the strategies they adopted in order to maximize their bonus payments are different. Why is this? An explanation couched in terms of *habitus* would appear opposite, for three basic reasons.

First, *habitus* is a disposition to behave in a certain way that is not based on rational calculation. Now we have already shown that the teams' strategies are not the result of such a calculation. After all, adjustment to the maximum DEC threshold is not possible since it would require real-time access to the output as it is being produced, which the operatives do not have.

Secondly, *habitus* is a disposition to behave in a certain way that takes account of past experience (Bourdieu 1990a: 56): 'The *habitus* … is the active presence of the whole past of which it is the product.' In the AME, long experience of working in the same team means a great deal to the operatives, perhaps all the more so since average seniority is any case high: in 1999, it ranged from 7 to 15 years depending on the team. As a result, individual practices engendered by *habitus* are immediately comprehensible to the other operatives. When a team is united not only by ties of friendship but also by trade union affiliation, past experience plays a major part in defining future strategies, without it always being necessary to discuss them, if only because certain strategic options can be elimi-

nated straightaway for technical reasons specific to the team. For example, it would be particularly inefficient for the micromechanics team to carry out as many procedures as possible in a minimum length of time, since the bulk of their work involves the repair and maintenance of speed recorder. Consequently, there is virtually no scope for choosing between short and long procedures.

Thirdly, the deployment of team strategies within the context of the DEC productivity bonus scheme, which makes discussion of the results obtained necessary and inevitable, further reinforces individual and collective *habitus*. Feldman and Rafaeli (2002) argue that organizational routines (which could also be denoted here by the term *habitus*) create connections between individuals. They provide the foundation for a shared understanding of the type of actions to be undertaken in a circumstance specific to a routine as well as of the choice of routine:

> The connections that routines make and the resulting understandings about both what need to be done to perform a routine and why the routine needs to be performed help people performing the routine accommodate both the specific variations and the abstract understandings. Consequently, routines are both the building blocks of stability and also the foundation of adaptation.

Despite the highly individual nature of the work in AME, such connections have been established through the operatives' desire to share the problems they encounter in their work, the solutions found to specific repair problems, etc.

The diversity of strategies deployed in confronting the same rule implies that certain hypotheses concerning individual behaviour are verified. In Chapter 4, we noted the credibility of the hypothesis that operatives compensate for the incompleteness of rules and the uncertainty surrounding their colleagues' intention to cooperate by adopting routines. Actual individuals seem neither to have recourse to complex counterfactual anticipations, even though they draw on 'interpretative' hypotheses, nor simply to react to slight variations in a few collective parameters. Individuals compensate for their ignorance of the detail of the mechanisms of collective influences by drawing on existing rules that serve as frameworks for their interactions, even though they were intended

to fulfil other functions. For example, operatives observe the way in which others attend to the debt sheet in order to gauge the degree of cooperation required of them. In doing so, they are compensating for the vagueness of those rules that have still to be interpreted by combining an acceptance of margins of tolerance with an ability to revise their own interpretations in case of failure. They are extremely tolerant when it comes to compatibility with observed facts and have at their disposal a few limited procedures for revising their interpretations in the event of discrepancies. From this point of view, individual decisions are guided by a few salient items of information gleaned from the situation. Thus the notion of *habitus* explains why operatives trust their colleagues to follow the same strategy, albeit within the limits of an interval within which variations in colleagues' work rates are tolerated. Consequently, the *rules operate within an interval in which individual strategies have no ambiguity*.

Finally, the notion of *habitus* makes it possible to conceptualize the changes of strategies observed in the team over the period between 1992 and 2000. *Habitus* – and this is also true of the notion of routine – can be said to contain its own transformative principle: as it mobilizes tacit and explicit knowledge, *habitus* transforms that knowledge (through processes of enrichment, modification, etc.) merely by virtue of the fact that the activity in question is going on. This knowledge in turn transforms the *habitus*, which explains why interpretations vary over time.

The meaning of rules emerges out of use

We have ascertained that teams applying what, *in formal* terms, is *the same rule adopt different strategies*. This finding will surprise all those who take the view that rules stamp their meaning on practices. In reality, the opposite happens, confirming once again the acuteness of Wittgenstein's analyses of rules.

As soon as the interpretation of a rule involves 'the substitution of one expression of the rule for another' (PU, §201), the result is that 'interpretations by themselves do not determine meaning' (PU, §198). And conversely, 'We do not extract rules from meaning, as if meaning were an object in space lying concealed behind the word. Meaning is not a crystal that is then dissolved in grammar' (*Dictées:* 82).

Rules are comparable to the words in a language in that they presuppose a practice (PU, §43): 'The meaning of a word is its use in the language'. It is use that gives meaning to rules and individuals' strategies that give substance to practices. According to Wittgenstein, uses denote what it is normal to do, while practices are closely linked to strategies and to learning.

In *Philosophical Investigations* and in *Remarks on the Foundation of Mathematics*, Wittgenstein gives many examples of rules governing human activity that do not have a precise formulation. Such precision is futile if it exceeds the degree of exactitude required by the context in which a rule is applied. This is the case, for example, with the following order given to someone:

> 'Stand roughly here' – may not this explanation work perfectly? And cannot every other one fail too?
>
> But isn't it an inexact explanation? – Yes; why shouldn't we call it 'inexact'? Only let us understand what 'inexact' means. For it does not mean 'unusable'. And let us consider what we call an 'exact' explanation in contrast with this one. Perhaps something like drawing a chalk line round an area? Here it strikes us at once that the line has breadth. So a colour-edge would be more exact. But has this exactness still got a function here; isn't the engine idling? (PU, §88).

Thus exactitude would seem to mean conformity with prevailing practices in respect of exactitude under given circumstances. Exactitude is a product of successful use. A level of exactitude that exceeds what is needed in practice is meaningless. This example demonstrates why any rule applied in a concrete situation has a pragmatic aspect that is inseparable from its meaning. Under these conditions, *the vagueness of rules is a necessity*.

Conclusion

Two types of answers to the question of how rules operate emerge very clearly from the empirical research undertaken in the course of this book. First, rules can establish a new practice (and in that sense they can truly be said to operate), provided they can draw support from an institutional system that, in the words of Bouveresse (1971:

360), is like 'a grammar of behaviours in accord to the rules'. After all, one of the conditions for the success of wage disindexation – apart from the factors linked to the real economy – was that the institutions involved, in particular the Ministry of Finance, were able to invent a *new language* including terms such as GAT (Grade drift, Ageing, Technicity), wages defined in terms of averages, wages defined in terms of levels, carry-over effect and so on, which did not remain a dead language but was actually put to use during pay negotiations. True, this new language was not the cause of disindexation, which was due rather to sustained efforts by the institutions involved to change agents' attitudes and representations. This finding has certain similarities with the research conducted by Piore *et al*. (1994) over the last few years on the importance of language in organizations. Secondly, our research into the effects of a productivity bonus in a workshop of the Paris Métro highlights the different effects of rules on comparable groups. If those rules do not produce their effects everywhere in the same way, it is because they come up against individual strategies which, filtered through the social world in which they are deployed and by the that are current there, given them different meanings.

Notes

General Introduction

1 This point is clarified in Chapter 1, which examines the whole question of trust.
2 Garnier (1986) provides a lucid explanation of the various notions of the incompleteness of employment contracts in economic theory.
3 The notion of the incompleteness of employment contracts is highlighted and developed in Reynaud (1987, 1988 and 1992).
4 This question is examined in detail by Vanberg (1994).
5 The notions of rules, conventions and norms are regarded as synonymous in this introduction. In following chapters, however, these concepts are defined separately.
6 The standard abbreviations of Wittgenstein's books are given at the end of the bibliography.
7 Cf. Virally (1960), Carbonnier (1983) and, for a recent synthesis, de Béchillon (1997).
8 The notion of *habitus* will be further developed in the course of Chapter 6.

1 Trust and the Wage Relationship

1 Some significant examples would include Gambetta (1988), Kreps (1990), Williamson (1993), Caillé (ed.) (1994), Lazaric and Lorenz (1998) and Laufer and Orillard (2000).
2 Orléan (1994) in A. Caillé (ed.). On pages 16–36, there is a very interesting critical analysis of Williamson's position (Williamson, 1993).
3 These three forms of trust were defined in collaboration with Pierre Livet. Cf. Livet and Reynaud (1998) in Lazaric and Lorenz: 266–84.
4 Cf. Marsden (1999) for a detailed analysis of the labour contract.
5 Cf. Reynaud (1992), pp. 23–6 and pp. 179–81 for a detailed presentation of the model.
6 We are not dealing in this paragraph with the profit sharing rule developed by Weitzman (1985).
7 RATP = Régie Autonome des Transports Parisiens. It is the Parisian transport authority. See the list of abbreviations at the beginning of the book.
8 The choice is not a binary one between a minimum and a maximum bonus. Moreover, each operative knows that he will not control the team result and hence the actual level of the bonus.
9 For a comprehensive exposition of these models, see Cahuc and Zylberberg (1996).

10 We will see what this notion actually means in Chapters 4 and 6.
11 In the sense defined in p. 13 of this book.

2 Wage Disindexation in France

1 SMIG: Salaire Minimum Interprofessionnel Garanti (annual wage guaranteeing a minimum standard of living), which in 1970 became the SMIC: Salaire Minimum Interprofessionnel de Croissance (growth-linked minimum wage).
2 Cf. Reynaud (1992): 50–1.
3 The notion of 'embeddedness' was introduced into the social sciences by Granovetter (1985).
4 Cf. Jobert and Théret in Jobert ed. (1994): 51.
5 An economic expert close to the Socialist Party, interviewed by Jobert and Théret in Jobert (1994): 51.
6 Cf. Boyer, *et al*. (1991): 22.
7 Patat (1992): 27.
8 Cf. Hen and Léonard (1995): 26–30.
9 On the rooting of expertise in the European project, cf. Jobert and Théret, in Jobert (1994): 52–4.
10 This point has been brilliantly argued by Jobert and Théret (1994): 52–4.
11 It was economists who attached the label 'theorem' to what was in fact only a declaration by former German chancellor Helmut Schmidt.
12 In this respect, the analyses of economic policy in the 1981–82 period are familiar: cf. Fonteneau and Muet (1985), Boyer (1994), in Dore, *et al.*, Faugère (1994a); Jobert and Théret (1994); Lordon (1997). Union density fell from 22.3 per cent in 1970 to 17.5 per cent in 1980 and then to 9.8 per cent in 1990, according to the OECD estimates (1994) cited by Lallement (1996).
13 According to an expert close to the Socialist government. Statements gathered by Jobert and Théret, in Jobert (1994): 36.
14 The procedure was to exempt certain items from taxation and to subsidize others.
15 Which is not incompatible with the first reason, namely a doctrinal position.
16 Cf. Gruson (1976). On incomes policy in the 1960s, see Dumez and Jeunemaitre (1989): 89–95.
17 In 1964, Barre had been associated with Gruson and Mathey in writing a report entitled 'Collège d'études et d'appréciation des revenus'.
18 In 1964, Delors wrote the report on the earnings conference, with Pierre Massé, head of the French economic planning commission.
19 The Commissariat Général du Plan, which was set up in 1946, is the French government agency in charge of economic planning. Over the years, it has been attached to various government departments: the Prime Minister's Office, the Ministry of Finance and the Ministry of Planning

and Regional Development. In 1971, it was attached directly to the Prime Minister's Office, as it has been once again since 1997.

20 The reference here is to the process of wage formation as a whole, since one of the economic policy measures in the disindexation policy related to the definition of the wage bill. This in turn had repercussions for the calculation of the average wage, etc. Cf. the second part of the relevant legislation.

21 Cf. Rials (1980). Standards bring into play certain fundamental values such as normality, rationality, morality, etc. Consequently, the need for interpretation reaches an extreme level. Cf. Chapter 3, p. 49, where this notion is examined further.

22 This tendency was to harden from 1986 onwards, when the definition of the wage bill was to be changed again. Henceforth, it was to be calculated on the basis of a constant workforce and without making allowances for individual pay entitlements. From now on, firms would no longer guarantee to maintain purchasing power unaided, since pay increases due to individuals themselves – as a result of promotion ('grade drift'), seniority ('ageing') or enhanced skills ('technicity') – were already built in ('positive GAT').

23 For John Searle (1969: 33), 'constitutive rules create or define new forms of behaviour'. He cites the celebrated example of the rules of football; they not only tell us how to play football but also create the opportunity to play it.

24 The various intervals in the model are not intervals calculated by the model. They are examples assumed to be close to the reality of the years 1982–83. The rate of 10 per cent, on the other hand, is the rate actually announced in 1982.

25 According to H_2, G's rate can never be correct; at best, it may be close to the actual rate.

26 This is still compatible with H_2.

3 Wage Bonus in the Paris Métro

1 AME = Atelier de Maintenance des Equipements Electroniques.

2 MRF = Matériel Roulant Ferroviaire.

3 Part of the present study is based on the work I did with Anne Flottès, an ergonomist working for the National Agency for the Improvement of Working Conditions at the time the interviews were conducted.

4 It so happens that the workshop manager in 2000–01, who had returned a year previously to take up his post, was one of the engineers who, in 1993, was charged with the task of implementing the new pay rule.

5 In 1992, there were 152 employees: 7 managers, 26 supervisors and 118 operatives.

6 Presentation given by the director of the AME in the presence of the chairman of the RATP on 4 November 1989.

7 A central management team of 5 people, some 20 departments, including the MRF, and the technical units, such as the AME.
8 *Le Département MRF en 1994*, internal memo, May 1992.
9 Cf. Riais (1980): 28.
10 Extracts from the 'Convention d'Expérimentation de la Démarche d'Efficacité Collective', reproduced in Annex A-2. Author's underlining.
11 Ibid. Author's underlining.
12 Interview with MRF managerial staff.
13 Conclusions drawn from the interviews with the director of the AME and a member of the management team.
14 Statement made by a supervisor in the course of an interview.
15 Only a general outline of the ratios is given here; see Annex A-3 for a more detailed presentation.
16 This output unit, which is specific to the AME, is defined on p. 54.
17 An explanation of how this time was calculated will be found on p. 56.
18 We draw here on observations made in another unit where the voluntary participation rule was strictly applied.
19 Cf. pp. 57–8 for an explanation of the snapshot observation method.
20 The time allowed, a concept frequently used in process industries, is the average time required to complete each task in a work cycle. It is calculated on the basis of time studies of operatives at work carried out by the staff of a company's production engineering department.
21 According to an internal AME document.
22 Cf. Chapter 5.
23 Attention is drawn to the contradiction between use of the term 'work rate of 100' and use of the snapshot observation method.
24 AME internal document. Cf. Annex A-3 for the calculations.
25 The words between quotation marks are taken from the interviews with the supervisors.
26 The statements between quotation marks were uttered by the director of the AME during the interviews I conducted with him.

4 Following the Rules

1 In September 2000, there were 162 employees: 8 managers, 35 supervisors and 122 operatives.
2 All the words in italics are expressions used in the workshop.
3 The operators of the various Métro lines will often be referred to simply as the 'lines' or 'line operators'. Each of them has a number. The 'lines' are the sole judges of which items of equipment are to be removed for maintenance; they decide, for example, whether a single faulty board or all the boards in a train should be removed for repair. In case of doubt, they may make a *removal on suspicion*.
4 The term 'implicit rule' was used by the operative; from my point of view, a rule is always explicit.
5 This point will be examined in greater detail in Chapter 5.

6 'For want of a better word' because the notion of routine is used in several schools of thought (evolutionary theory, organizational theory, cognitivism) in very different senses.
7 For an extended version of this section, cf. Reynaud (2000).
8 Egidi in Cohen *et al*. (1996): 687.
9 The group's report was published in *Industrial Corporate Change* (1996), 5 (3): Cohen *et al*. (1996).
10 Cyert and March (1963) were the first to point out that routines can be characterized as 'satisficing'.
11 Cited by Cohen (1991: 135).
12 Cf. Nelson and Winter (1982: 105). I am grateful to Christian Bessy for drawing my attention to this point. Cf. Bessy (2001).
13 We consider procedure and algorithm to be synonymous. On this point, our position is the same as that of M. Egidi (1992: 170, note 4): 'I use the word 'procedure' in a precise sense of algorithm, which (by the Church thesis) can be represented by means of a Turing Machine and mechanically executed.'
14 Procedural rationality and adaptive rationality are not radically different from each other; see March and Simon (1958), Chapter 7, and March (1975).
15 The expression is borrowed from Pierre Bourdieu. Cf. Bourdieu (2000): 160.
16 Since rules help in the search for a solution but do not provide it. The reader is referred to Reynaud (1992), Chapter 2.
17 Pierre Bourdieu has expressed similar ideas on the incompleteness of rules and the scope that exists for interpreting them. Cf. in particular, Bourdieu (1990b) and (2000), Chapter 3, pp. 156–65. This point is developed in Chapter 6.

5 How Rules Operate in Practice

1 As we will see, the allusion here is to amendments to the team contracts and to changes in the weighting coefficients.
2 Productivity in value terms is defined by the following ratio: WOU for the entire Saint-Ouen site/average annual size of workforce. As is clear from Figure 5.1, the evolution of productivity in value terms is much the same as that of productivity measured in volume terms.
3 Météor – Métro Est-Ouest Rapide, an entirely automatic Métro line.
4 Except in the micromechanics team. However, we will examine later the role played by the weighting coefficients in making this team comparable with the others.
5 There are four technological generations.
6 In this chapter, the percentage of the bonus always refers to the maximum bonus.
7 The calculations are based on half-yearly series.
8 Cf. Table 3.2.

9 The question of the NTRs was mentioned several times by the operatives during the interviews conducted in 1993.
10 The carry-over rule does not apply from summer to winter.
11 By regressing debt levels against the fault recurrence rate, we found an R^2 of 0.14 and a significant coefficient for the 1993–95 period only. This result has to be considered not as proof but rather as an indication of a link between the productivist strategy and the deterioration of the fault recurrence rate. In order to obtain proof, we would have to examine the time spent on the various procedures by category of equipment.
12 Unless an error is made in entering the procedures carried out into the computer system (which did happen in the relays team).
13 If the operatives had obeyed the 'one-third rule' while retaining 'normal' quality standards, procedure times would also have risen appreciably.
14 These are the terms used by management.
15 The fractions in this table may seem surprising; in reality, for those amendments that have two sections, one relating to the past and the other to the future, we have allocated a weighting equal to 1/2 to each configuration.
16 See Chapter 3 for a summary of the equivalences between working time and labour productivity.
17 See Annex C-5 on the content of the amendments to the EK3 contract.
18 The supervisor who was in charge of the team agrees with this diagnosis.
19 The carry-over rule was introduced very soon after the DEC agreement in order to stop operatives being penalized by a decrease in workloads during the summer. Fewer trains run in summer than in winter, when the effects of bad weather also make themselves felt. This is why excess production can be carried over from winter to summer but not vice versa.
20 The coefficients rose from 0.87 to 1.01 (BPU1), from 1.06 to 1.48 (BPU2) and from 0.57 to 0.77 (BPU3).
21 Discussion with the supervisor in charge of this team.
22 For AME as a whole, the fault recurrence rate is the average of the rates for the individual teams. The 2.84 per cent relates to all the productive teams in the AME.
23 Cf. pp. 98–105 of this chapter, which focuses on team EK3.
24 Each of the monthly qualitative results (debt level and fault recurrence rate) is reflected in the award of a monthly mark ranging between –2 and +2. At the end of each six-month period, the marks awarded for debt levels and fault recurrence rates are summed to give the overall quality mark.
25 We have used the average absenteeism rate in 1991 and 1992 because the figures for the micromechanics team differ too much from one year to the next.

26 The debts for the micromechanics and electronics sections are counted separately from November 1994 onwards; for the period 1993–95, I have assumed that the debts incurred by the micromechanical activities were equivalent to the debts for the team as a whole.
27 The coefficients 2.5 and 13 had been applied since the introduction of the DEC. Cf. Amendment no. 1 of 7/12/1993.
28 The coefficient changed in May 1996 and was applied with effect from the May–October 1996 bonus calculation period. Decision of 3/7/96.
29 The coefficient changed at the end of October 1999 and was applied with effect from the November 1999–April 2000 bonus calculation period.
30 Serverin (2000), in E. Serverin and A. Berthoud: 209–25.
31 I am grateful to Evelyne Serverin for having reintroduced me to Max Weber.

6 Rules, Routines and *Habitus*

1 The firm has to take into account the total cost of a dismissal, including any possible damage to its reputation.
2 This wage form should not be confused with Taylor's differential piece work.
3 On this point, see in particular Bouveresse (1971, 1976, 1986 and 1987).
4 Cf. for example: Virally (1960), Carbonnier (1983) and, in particular, Hart (1961) and for a survey: de Béchillon (1997), whose book *Qu'est-ce qu'une règle de droit*? is given over to an examination of this question.
5 The converse does not apply, however, since a rule can be general without being abstract.
6 The distinction between rules and decisions is outlined in the introduction to the book.
7 In Reynaud (1992), I advanced the idea that pay rules are evaluative instruments with two dimensions to them: standard and reference model. This notion draws its inspiration from the work of the legal philosopher Paul Amselek. Cf. Amselek (1964), (1972).
8 The rule–model notion does of course have other meanings. Cf. Reynaud (1992), Chapter 2.
9 Wittgenstein introduced the notion of *form of life* in (PU §19): 'to imagine a language means to imagine a form of life'.

Annex A-1: The AME Teams in 1992

Name of team	*No. of BPUs and operatives*	*Nature of activity*
Logistics	– 'Spare parts' store (5 operatives) – 'Arrival/Departures' store (7 operatives)	– management of spare parts stored in boxes at the AME – reception and dispatch of parts serviced at AME
Micromechanics	3 Non-specialized BPUs (19 operatives)	Production of: – speed recorder – recording devices and chargers – speedometers. Corrective and preventive
Control electronics (EK1)	4 BPUs (Traction, bracking, slip-slide control), specializing in different types of equipment (19 operatives)	Control electronics: – analogical electronics – micro-controller Corrective: 60%. Preventive: 40%
Control electronics (EK2)	2 BPUs (automatic train control, and self-steering systems) (14 operatives)	Repair, Inspection and modification of automatic control systems and sub-systems Corrective.
Power electronics (EK3)	2 Power electronics BPUs (14 operatives)	Power electronics Corrective: 80%. Preventive: 20%
Relays	3 BPUs specializing in different types of relays (23 operatives)	Corrective procedures and major service of: – relays from MP 59 stock – relays from MF 67 stock – relays from MF 77 stock for the whole of the urban stock.
Test system design and production	1 BPU (4 operatives)	All work required for production of test systems, hence production of prototypes only.

Source: AME (RATP).

Annex A-2: The DEC Agreement

RATP
Rail Rolling Stock Department
Human Resources

TRIAL AGREEMENT ON A TEAM EFFICIENCY IMPROVEMENT SCHEME
* * *

The following agreement is concluded between the director of the RATP's Rail Rolling Stock Department, Didier Langrand, on the one hand, and the trade union organizations listed at the end of this document, on the other. The provisions of the present agreement shall apply only to the trial team efficiency improvement scheme that is to be introduced in the Rail Rolling Stock Department.

1) – *The objectives of the team efficiency improvement scheme*

1.1 – The Rail Rolling Stock Department's remit is to serve the travelling public by making available, on a daily basis, safe, comfortable trains that it has acquired and is responsible for maintaining. Each of the department's operational teams contributes to this remit through the efficiency of its own operations and by producing output of a good level both quantitatively and qualitatively.

1.2 – The aim of the team efficiency improvement scheme that the Rail Rolling Stock Department is seeking to introduce is to encourage each team voluntarily to make efforts to improve its efficiency. A contract will be drawn up locally following discussion between team members and supervisory staff in which measurable quantitative and qualitative output indicators will be laid down.

2) – *Sphere of application*

The Rail Rolling Stock Department intends to launch this scheme, by way of experiment, among production teams in its workshops. Functional teams may also be involved eventually. For the time being, the scheme will apply to manual workers and technicians and, as a provisional measure (prior to the introduction of specific measures aimed at supervisory staff), the supervisors of these teams.

3) – *Principle*

3.1 – The scheme is a collective one and is based on the principle of voluntariness. It applies to a team of individuals as constituted within the department's organizational structures. When possible, it may be offered to a workshop as a whole. In the launch phase, and for certain geographical sites, it may be preferable to begin with smaller teams. (For

simplicity's sake, the work 'team' will be used in the rest of the agreement whether the group of individuals concerned is made up one team or more than one team.)

3.2 – A specific local agreement will be drawn up for a period of three years between those team members who opt into the scheme and their supervisory staff.

- Quantity and quality indicators fixed by the team's supervisors in consultation with team members shall provide the means of monitoring the team's output and determining the level of efficiency attained.
- A lower limit and an upper limit shall be laid down for each of the indicators.
- *Operatives* shall receive a share of the efficiency gains achieved in the form of a six-monthly bonus calculated by means of a simple formula based on the quality and quantity indicators laid down and the results actually obtained. The maximum value of this bonus shall be set at 3,040 FF for each six-month period on 01/01/91. This value will be increased in line with increases in basic pay.

This bonus, which is independent of the bonuses currently paid (output and good service bonuses, times allowed where applicable), will be paid in addition to these bonuses.

- The department shall organize training programmes that will enable operatives to respond to the scheme.

4) – *Specific modalities*

4.1 – Determination of quantity indicators

These indicators take account of each operative's individual contribution to the team.

The lower limit is set by the indicators equating to the normal average activity of a manual worker in the department (work on the basis of time allowed or approved time).

The upper limit is reached when the corresponding indicators indicate a 20% increase in direct labour productivity, with the required quality level.

Should the company make a significant change to work methods, task organization or tools, the reference values for the indicators will be reviewed as a result.

4.2 – Determination of quality indicators

These indicators take account of 'customer' satisfaction with the team. As a guide, the customer may be: the line operator in the case of the maintenance workshop or the maintenance workshop or another maintenance team in the case of the maintenance teams in the workshops. They are established after consultation with these clients. They are measurable and monitored on a monthly basis. The quality level equating to the upper limit may be the current level if the customer is currently completely satisfied. In other cases, it will be necessary to define with the customer the various degrees of improvement that need to be made.

4.3 – Respective contributions of the indicators
The level of the bonus payment shall be a function of the quality and quantity indicators.
The bonus calculation formula shall be established for each team in accordance with the nature of the work and the opportunities for evaluating results.

4.4 – Link between the bonus and 'presenteeism'
The bonus shall be calculated for the team as a whole and paid to each team member on the basis of the number of days' work he has completed in the six-month period in question, excluding all periods of unpaid absence (for whatever reason) and sickness.

5) – *Tracking committee*
In order to be able to analyze the progress of the trial scheme, a tracking committee shall be set up, on which the signatories of the present agreement will be represented and which will meet once every six months.
The signatories agree to meet three months before expiry of the first specific local agreement in order jointly to consider how to follow up the trial agreement.
The staff representatives sitting on the Departmental Economic and Professional Committee shall be informed once a year of the progress of the scheme.

Paris, ... 1991

Director of the Rail Rolling Stock Department

D. Langrand

Signatures of the trade union organizations

Inter-union grouping of the CGT manual by workers sections in the RATP	RATP service workers represented the CFDT union
CGT Affiliated Union of RATP supervisors, technicians, clerical and allied staff	Confederation of Independent RATP Unions
Inter-union grouping of CGT-affiliated RATP engineers and managerial staff	RATP branch of Force Ouvrière
RATP branch of the Administrators, Technicians, Supervisors, Engineers and Managerial Staff section of the Force Ouvrière union	Christian Trade Union of RATP Personnel (CFTC)
Autonomous grouping of all RATP categories	CGC RATP Trade Union

Annex A-3: The Minimum and Maximum DEC Ratios

1. Quantitative ratios
Output = team's total output over 6 months (no. of WOUs)/no. of operatives. Minimum DEC ratio = Physical output in 1991 × AME approved work time (minimum DEC time: 5 hours 80)/average team time. (The average time is derived from the snapshot observations).

Maximum DEC ratio = Physical output in 1991 × max DEC work time (6h 50)/average team time.
An overall mark, from 0 to 10, is determined on the basis of the two thresholds, with 0 being awarded for the minimum DEC threshold and 10 for the maximum DEC threshold.

Example of a team:
'The change over to a reference working time of 6 hours 30 minutes at a work rate of 100 makes it possible to release 1 operative. The output produced in 1991, 16316 output units, will have to be produced in 1992 with 18 operatives instead of 18.6.' (…)

- 'The reduced average time for team EK1 with 18 operatives at a work rate of 100 is 6 hours 20 minutes (6.34).
- Average time for 18 operatives = 6.13 × 18.6/18 = 6.34

The DEC target for the corrective element is calculated as follows:

- 1991 corrective output ratio = 0.5 × (16316/15) = 544 (the figure 15 equals the number of agents who produced 16316 weighted output units in 1991.
- Minimum corrective DEC ratio = 544 × (5.80/6.34) = 498.
- Maximum corrective DEC ratio = 544 × (6.50/6.34) = 588'.

2. The qualitative ratios relate to both external and internal quality
External quality = number of recurrent faults/number of components received. The information in the database is used as a norm in order to award a mark between 0 and 5 (0 equates to the worst ratio recorded in the database).

Internal quality = team's ability to deal with peak periods and not generate debts; the principle is the same as for external quality (variation from 0 to 5). Overall quality is the sum of the external and internal quality marks (0 to 10).

3. Calculating the bonus
In general, the overall bonus is the product of two marks.
In the following example, the quantity indicator = 9 and the quality indicator = 9.
DEC = 9 × 9 = 81; thus the bonus is 81 per cent of the maximum (500 FF).

Source: Extracts from a contract of a team.

Annex B-1: The Levels of Maintenance in the AME

There are three levels of maintenance in the Rail Rolling Stock Department, each of which requires different measures and procedure times. The AME carries out 2nd and 3rd level maintenance.

1st level: This involves exchanging a unit or valve on a train said to be faulty. The aim is to make the train available to the line operator as quickly as possible. The valve or unit that is withdrawn is then sent to the AME. This level of maintenance is carried out as close as possible to the lines, at an inspection station or in a maintenance workshop.

2nd level: This involves exchanging the faulty sub-unit on the equipment sent to AME (relay or circuit board, for example). Once repaired, the component is added to the stock of spare parts, after it has been checked to ensure it is working properly. This procedure provides the line operators with a permanent stock of spare parts in good working order.

3rd level: This involves repair, in the usual sense of the term. The dismantled sub-unit is generally repaired by replacing a faulty component and is then added to the stock of spare sub-units.

Source: RATP.

Annex C-1: EK1 Regressions Between Debt Levels and Fault Recurrence Rates

Note: frr = fault recurrence rate

Annex C1a. Monthly series 1992–2000

Source	SS	df	MS	Number of obs. = 90
				F(1, 88) = 208.06
Model	91445.8745	1	91445.8745	Prob > F = 0.0000
Residual	38677.7138	88	439.519475	R-squared = 0.7028
				Adj R-squared = 0.6994
Total	130123.588	89	1462.06279	Root MSE = 20.965

Debts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
frr	26.31542	1.824388	14.424	0.000	22.68983	29.941
_cons	–4.505484	4.292206	–1.050	0.297	–13.03534	4.024372

Annex C1b. Monthly series 1992–1995

Source	SS	df	MS	Number of obs. = 30
				F(1, 28) = 34.53
Model	14592.521	1	14592.521	Prob > F = 0.0000
Residual	11833.1407	28	422.612167	R-squared = 0.5522
				Adj R-squared = 0.5362
Total	26425.6617	29	911.229712	Root MSE = 20.558

Debts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
frr	19.35423	3.293683	5.876	0.000	12.60743	26.10104
_cons	0.4100022	8.956367	0.046	0.964	–17.93628	18.75629

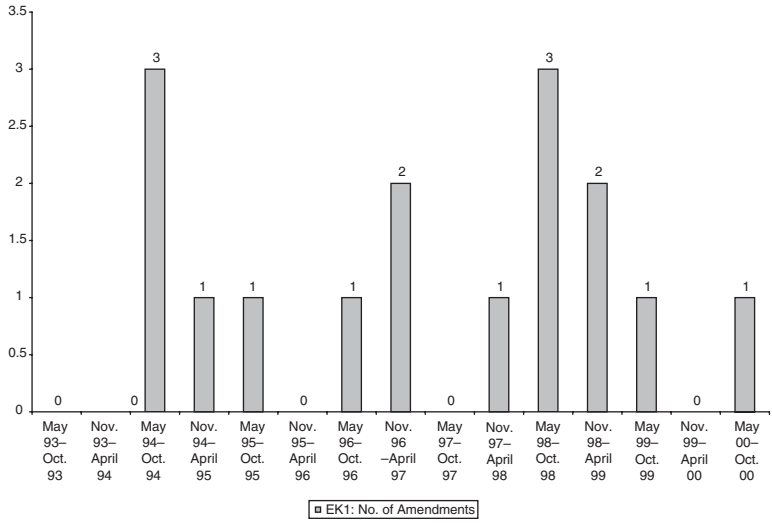
Annex C1c. Monthly series (1995–2000)

Source	SS	df	MS	Number of obs. = 61
				F(1, 59) = 317.86
Model	88973.4903	1	88973.4903	Prob > F = 0.0000
Residual	16515.08	59	279.91661	R-squared = 0.8434
				Adj R-squared = 0.8408
Total	105488.57	60	1758.14284	Root MSE = 16.731

Debts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
frr	31.35627	1.758767	17.829	0.000	27.83698	34.87555
_cons	–8.027433	3.871083	–2.074	0.042	–15.77345	–0.2814141

Source: Author's calculation from the AME data.

Annex C-2: EK1 Number of Amendments Concluded Between 1992 and 2000



Source: Author's calculation from the AME data.

Annex C-3: Content of Amendments Negotiated by EK1

Date	*Period covered*	*Reasons for the amendment*	*Decision*	*Observations*	*Production manager and EK1 Supervisor*
18/5/94	1/2/94–30/4/94 (3 months)	Reconditioning of 2 circuit boards hence increased procedure time	Cancellation of team debts for these 2 boards	EK1 paid 100% of bonus end April	A & B
19/5/94		Since Sept. 93, repair of soldered joints on certain units	Debt thresholds for certain units reduced to 0		A & B
8/10/94	May–October 1994	Problems with manning levels and increased workloads for MF77 AND MI79 stock	Updating of DEC parameters: no. of operatives, internal and external quality indicators	(1) operatives requested to work 2 to 3 Satur days and to increase daily working time (2) Reduction in quality of reconditioning work for 1 month	A & B
24/11/94	1/4/94–31/10/94 (7 months)	Still the 2 boards to be reconditioned and all racks and some MF77 boards. Hence increased procedure time	Team internal quality debts not taken into account	End Oct. EK1 on 90.27% of DEC instead of the 2% they would have had if no amendment had been signed	A & B

continued

Date	*Period covered*	*Reasons for the amendment*	*Decision*	*Observations*	*Production manager and EK1 Supervisor*
15/5/95	1/11/94–30 April 95 (6months)	Increase in fault recurrence rate due to a recording error in the 'Damage' database: the 'reliability enhancement' section should be counted as 'status monitoring' or 'reconditioning'	Monthly adjustments to fault recurrence rates	End April 95, EK1 was on 92.39% of DEC	A & B
31/5/96	Nov. 95–Oct. 96	Recalculation of debts	Redefinition of internal and external quality indicators for all BPUs		A & B
20/11/96	1/5/96–1/11/96 (6 months)	(1) 1 operative sick for 3 weeks in Sept!; (2) new universal rack tester hence increased intervention times	Change in the MI79 weighting coefficient from 1.21 to 1.39; 8 debts/ months excluded from calculation of QI	End Oct. 96, EK1 was on 85.4% of the DEC	C & D
23/1/97	Jan. 97	1 new operative, hence training time	Size of team (and hence DEC targets) reduced for 1 month		C & D
14/4/98	From Nov. 97	On-going procedures on 2 boards	Debts relating to these boards not taken into account	In April 98, EK1 was on 94.4% of DEC	C & D

continued

Date	*Period covered*	*Reasons for the amendment*	*Decision*	*Observations*	*Production manager and EK1 Supervisor*
3/6/98	April 98–end June 98 (3 months)	Delay in supply of 1 unit	Debts relating to that unit not taken into account		C & F
18/8/98	August 98–Oct. 98 (3 months)	Reduction in debts relating to one board because of the obsolescence of the S400 relays	Debts relating to this board not taken into account		C & G
6/10/98	Sept. and Oct. 98	Logistical problems (cleaning machine, personnel) hence problems with racks P1 and P3	Adjustment of debt levels	End Oct. 98 EK1 was on 100% of the DEC	C & G
2/3/99	Nov. 98–to March 99 (6 months)	Introduction of new computerized repair management system and large-scale withdrawal of components from line 8 and numerous reasons apparently inherent in the functioning of the team	Adjustment of monthly debt levels. Except in Nov., final debt = 35 irrespective of the initial debt level		C & G

continued

Date	*Period covered*	*Reasons for the amendment*	*Decision*	*Observations*	*Production manager and EK1 Supervisor*
8/4/99	March and April 99	Introduction of new computerized repair management system and 1 testbench out of action from 2 weeks	Adjustment of monthly debtlevels. Final debt = 35 – even before the actual debt level is known!	End April 99, EK1 was on 100% of the DEC	C & G
8/7/99	May and June 99	Change in the informatic system			
7/7/00	May and June 2000	Start-up of the new informatic system and inclusion of CVLOCC fleet into team debts	Adjustment of monthly debt levels		D & G

Source: AME amendments and summary of amendments (triennial contract review, Dec. 99).

Annex C-4: All EK1 Amendments Relate to DEC in *t* –1

Amendment date	*No. of months covered*	*Bonus calculation period covered*
18 May 94	1/2/94–30/4/94 (3 months)	DEC *t*–1
19 May 94	6 months	DEC *t*–1
Oct. 94	6 months	DEC *t*–1
24 Nov. 94	1/4/94–31/10/94 (7 months)	DEC *t*–1
15 May 95	1/11/94–30 avril 95 (6 months)	DEC *t*–1
31 May 96	Nov. 95–Oct.96	DEC *t*–1 and current DEC
20 Nov. 96	1/5/96–1/11/96 (6 months)	DEC *t*–1
23 Jan. 97	Jan. 97	DEC *t*–1 and current DEC
14 Apr. 98	Nov. 97–April 98	DEC *t*–1
3 June 98	April 98–end of June 98(3 months)	DEC *t*–1
18 August 98	August 98–October 98	Current DEC
6 Oct. 98	Sept. and Oct. 98	DEC *t*–1
2 March 99	Nov. 98–March 99 (6 months)	DEC *t*–1
8 April 99	March and April 99	DEC *t*–1
8 July 99	May and June 99	DEC *t*–1
7 July 00	May and June 2000	DEC *t*–1

Source: Author's synthesis from the AME data.

Annex C-5: Content of EK3 Amendments

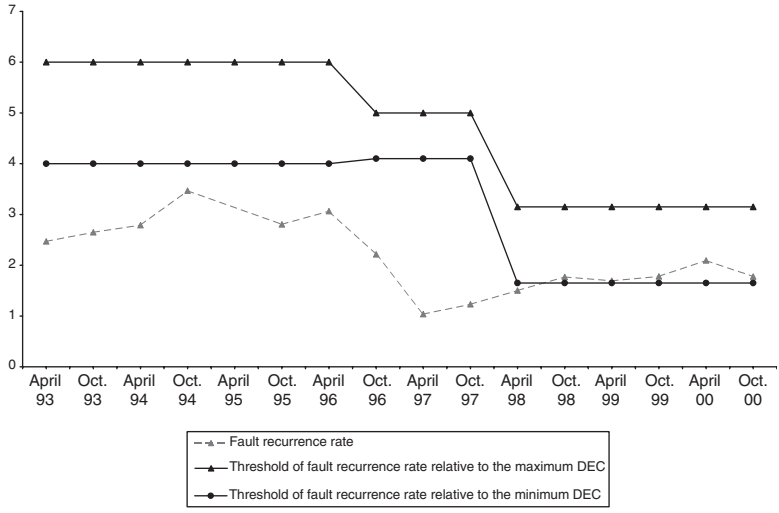
Date	*Period covered*	*Reason for request*	*Decision*	*Observations*	*Production manager and EK3 supervisor*
9/5/96	Nov. 95–April 96	Request to change the method of calculation of BPU1's debt levels in respect of the pairing of 2 units. The pairing of units facilitates analysis of breakdowns. However, it impacts negatively on internal quality. Request that debts should be calculated per pair and per item of equipment	(1) The debt for these 2 units was divided by 2. (2) Proposal of thresholds for fault recurrence rates	In an annex to the amendment, it is stated that the result prior to the amendment was 83%. It was 100% after the amendment	X & Y
17/4/97	April 97	Request for special dispensation in respect of internal quality (debts) for BPU1/BPU2 because of shortages of one component and establishment of a reliability section	Certain units not counted in assessing internal quality		Z & Y

continued

Date	*Period covered*	*Reason for request*	*Decision*	*Observations*	*Production manager and EK3 supervisor*
11/9/97	From June 97 and until the 2 sets of equipment racks were returned to the team	Loan of 2 sets of valves to the test system design and manufacture team	These 2 debts were removed from the team debt until the 2 sets of valves were returned to the team		T & U
22/10/97	From Nov. 97	Lowering of upper limits on fault recurrence rates because the observed rates were low; elimination of 'abnormally high' debts because of supply problems + inventory hence reduction in debt threshold	Everything accepted		T & U
20/8/98	From August 98 until receipt of spare parts (scheduled for Oct.)	Lack of spare parts for 3 units	The 3 debts were removed from the team debt		T & U
8/12/98	From Dec. 98 until receipt of spare parts	Lack of spare parts for 4 units	The 4 debts were removed from the team debt		T & U
10/5/99	From May 99	Reconditioning of valves	Reduction in team debt threshold		T & U

Source: Author's synthesis from the AME data.

Annex C-6: Evolution of the Fault Recurrence Rate and of the Minimum and Maximum DEC Thresholds (EK3)



Source: Author's calculation from the AME data.

Annex C-7: EK3 Regressions Between Labour Productivity and Debts

Annex C-7a: Regress prod debts (monthly data: April 1997–October 2000)
prod = labour productivity

Source	SS	df	MS	Number of obs. = 43
				F(1, 41) = 11.05
Model	3125.93027	1	3125.93027	Prob > F = 0.0019
Residual	11599.5283	41	282.915324	R-squared = 0.2123
				Adj R-squared = 0.1931
Total	14725.4586	42	350.606156	Root MSE = 16.82

Prod	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
debts	–1.37173	0.412674	–3.324	0.002	–2.205142	–0.5383176
_cons	96.81753	4.787567	20.223	0.000	87.14885	106.4862

Annex C-7b. Regress debts frr

Source	SS	df	MS	Number of obs. = 43
				F(1, 41) = 22.90
Model	595.302012	1	595.302012	Prob > F = 0.0000
Residual	1065.97583	41	25.9994105	R-squared = 0.3583
				Adj R-squared = 0.3427
Total	1661.27784	42	39.5542343	Root MSE = 5.099

Debts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
frr	–11.14749	2.329647	–4.785	0.000	–15.8523	–6.44267
_cons	28.67293	4.020935	7.131	0.000	20.55249	36.79337

Source: Author's calculation from the AME data.

Annex C-8: Regressions in the Micromechanics Team

1) regress t_prod mic_prod (November 1992–October 2000)
In which t_prod and mic_prod are team productivity and micromechanics productivity respectively.

Source	SS	df	MS	Number of obs. = 100
				F(1, 98) = 10977.98
Model	112302.561	1	112302.561	Prob > F = 0.0000
Residual	10023.5376	98	102.280996	R-squared = 0.9181
				Adj R-squared = 0.9172
Total	122326.099	99	1235.61716	Root MSE = 10.113

t_prod	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
mic_prod	0.6315374	0.0190591	33.136	0.000	0.5937153	0.6693595
_cons	42.83424	3.301027	12.976	0.000	36.28346	49.38502

2) regress t_frr mi_frr
In which t_frr and mic_frr are the team and micromechanics fault recurrence rates respectively.

Source	SS	df	MS	Number of obs. = 98
				F(1, 96) = 257.61
Model	442.295097	1	442.295097	Prob > F = 0.0000
Residual	164.8261	96	1.71693854	R-squared = 0.7285
				Adj R-squared = 0.7257
Total	607.121198	97	6.25898142	Root MSE = 1.3103

t_frr	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
mi_frr	1.032791	0.0643478	16.050	0.000	0.9050615	1.16052
_cons	–0.2014599	0.2917795	–0.690	0.492	0.7806376	0.3777178

3) regress t_debts mi_debts
in which t_debts and mi_debts are team debt levels and micromechanics debt levels respectively.

Source	SS	df	MS	Number of obs. = 72
				F(1, 70) = 2330.50
Model	14433.2871	1	14433.2871	Prob > F = 0.0000
Residual	433.524113	70	6.19320162	R-squared = 0.9708
				Adj R-squared = 0.9704
Total	14866.8112	71	209.391708	Root MSE = 2.4886

t_debts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
mi_debts	1.028437	0.0213036	48.275	0.000	0.9859483	1.070926
_cons	0.9597754	1.29604	0.741	0.461	–1.625095	3.544646

Source: Author's calculation from the AME data.

Annex C-9: Amendments Negotiated by the Micromechanics Team

Date	*Period covered*	*Object*	*Decision*	*Production manager and micromechanics supervisor*
07/12/93	From January 94	Recognition of 2 seperate activities within the team: micromechanics and electronics	Establishment of 2 DECs: one for micromechanics, one for electronics	V & W
09/05/95	From 1 November 94	Increase in produre times, etc.	RER stock included in calculation of debt levels	V & X
08/04/98	From 8 April 98	BPU3 has additional preventive maintenance tasks: recording devices, chargers, end of route indicators for MF77 stock; chargers, speedometers for MI79 stock; speedometers for MI84 stock	These tasks to be counted as WOUs	U & R
22/06/98	May 98 Dec	Adjustment of debt because of disruptions to supply of cams for recording devices on MI79 stock	Cancellation of 12 major servise debts relating to this type of machine for May 98	U & R

continued

Date	*Period covered*	*Object*	*Decision*	*Production manager and micromechanics supervisor*
24/11/98	From Nov. 98	Modification of 'several parameters used to calculate the bonus linked to the DEC scheme'	Increase in BPU3's minimum and maximum DEC thresholds; changes to qualitative indicator scale for the 3 BPUs	U & R
09/03/99	Mid. February–mid. March	Lack of spare parts for speedometers for MI79 stock	Debts relating to these speedometers not taken into account and 5 other debts cancelled	U & R
21/05/99	From May 99	The debt threshold for MI79 clocks should be reduced to 0 because that component is no longer maintained at AME, but is sent there nevertheless and modification of a circuit board; the threshold for this board should be reduced to 0 for the duration of the modification (2 years)		U & R

Soure: Author's synthesis from the AME data.

Annex C-10: Chronology of Changes to Coefficients and Other Parameters Affecting Productivity

EK1							
Date	Amendment to contract or review?	MF77	MI79	MF67	MI84	Inception date	Observations
14/06/92	Contract no. 1	1.20	0.90	0.80	0.40	August 92	
23/11/95	Triennial review	1.34	1.21	0.76	0.42	May 95	
20/11/96	Amendment		1.39			May 96–Oct 96	MF 67 and MI 84 handed over to EK4 Oct 96
		1.34	1.21			Oct. 96	
01/12/99	Triennial review	1.27	1.14			Nov. 96	
EK3							
Date	Amendment to contract or review?	UPE1 (MF77)	UPE2 (MI79)	UPE3		Inception date	
14/06/92	Contract no. 1	0.87	1.06	0.57		August 92	
13/02/96	Triennial review of contract no. 1	1.01	1.48	0.77		May 95	
							October 96: BPU3 attached to EK4

continued

Micromechanics

Date	Amendment to contract or review?	Electronics	Micromech. Corrective	Micromech. Preventive		Inception date	
14/06/92	Contract no. 1 (source: amendt. of Dec. 93)	1	2.5	13		August 1992 –April 96	
30/07/96	Triennial review of contract no. 1	1.173	1.419	10.361		May 96– Oct. 99	
21/06/92	Amendment	1.902	1.117	6.482		Nov. 98	

EK4

Date	Amendment of contract or review?	MF67 (UPE1)	MI84 (UPE2)	UPE3	RMDC	Inception date	
14/06/92	Other contracts of the # BPUs	0.80	0.40	0.57	2.38	August 92	EK4 set up in Oct. 96; this table shows evolution of coefficients over time
1995 & 1996	Other contracts of the # BPUs	0.76	0.42	0.77		May 1995	
26/07/97	EK4's contract no. 1	0.76	0.42	0.77		Oct. 96	New contract following integration of BPUs MF67, M 84 and UPE3 (EK3)

continued

26/03/99	EK4's contract no. 2	0.76	1.65	0.68 & 0.6	1.00	Nov. 98	New contract following integration of RCFM (relays in critical failure mode)
Relays							
Date	Amendment to contract or review?	UPE1 (MF67)	UPE2 (MF77)	UPE3 (MP, PA)	UPE4 (relays)	Inception date	
14/06/92	Contract no. 1	1.20	0.90	0.40		August 92	
15/02/96	Triennial review of contract no. 1	0.885	1.076	0.891		May 1995	
1999	Review						RMDC4 incorporated into EK4 and other BPUs transferred to Sucy
EK2							
Date	Amendment to contract or review?	UPE1 (electr)	UPE2 (PA)			Inception date	
1992	Contract no. 1	1.25	0.95			August 92	
07/03/95	Amendment no. 2		1.14			May 95	
06/96	Review of contract no. 1	1.053	1.52				
11/96	Amendment to revised contract of June 96	0.95	1.25			Nov. 96	

Source: Author's synthesis from the AME data.

Annex C-11: Evolution of Labour Productivity in Volume Terms

	EK1	*EK2*	*EK3*	*Micromechanics*	*Relays*	*EK4 (*)*	*AME (**)*
Annual rate ofgrowth in labour productivity (93–95) in %	–6.01	13.49	4.33	14.18	–9.81		1.2
Annual rate ofgrowth in labour productivity (93–00) in %	–3.65	4.27	3.76	7.79	–0.50	–2.82	2.84

Notes
* EK4: from April 97 to Oct. 00.
** For the AME, the data are from Dec. 92 to Dec. 99.
Source: Author's calculation from the AME data.

Bibliography

Aglietta, M. (1995), 'Normativité de la monnaie et indépendance des banques centrales'. Miméo CEPII, colloque *L'économie normative*. Paris, 23–25 Oct.

Aglietta, M. and Orléan, A. (1982), *La Violence de la monnaie*. Paris: Presses Universitaires de France.

Akerlof, G. and Yellen, J. (eds), (1986), *The Efficiency Wage Models of the Labor Market*. Cambridge: Cambridge University Press.

Akerlof, G. (1982), 'Labor Contracts as Partial Gift Exchange'. In *Quarterly Journal of Economics*, (97), Nov.: 543–69.

Amselek, P. (1964), *Méthode phénoménologique et théorie du droit*. Paris: Librairie Générale de Droit et de Jurisprudence.

Amselek, P. (1972), 'La phénoménologie et le droit'. In *Archives de Philosophie du Droit*, t. 17: 186–259.

Ancori, B., Bureth, A. and Cohendet, P. (2000), 'The Economics of Knowledge: the Debate about Codification and Tacit Knowledge'. In *Industrial and Corporate Change*, 9(2), June: 255–87.

Aoki, M. (2001), *Toward a Comparative Institutional Analysis*. New-York: MIT Press.

Argyris, C. and Schön, D. (1974), *Theory in Practice*. San Francisco, Jossey-Bass.

Arrow, K. (1968), 'The Economics of Moral Hazard: Further Comment'. In *American Economic Review*, 58 (3). Part. I, June: 537–539.

Askénazy, P. (2000a), '35 heures, incitations et flexibilité'. In *Revue d'Economie Politique*, 110 (1), Jan.–Feb.: 1–18.

Askénazy, P. (2000b), 'Réduction du temps de travail et innovations organisationnelles négociées'. In *Revue d'Economie Politique*, 111 (2), Mar.–Apr.: 247–269.

Atias, C. (1982), 'Quelle positivité ? Quelle notion de droit ?' In *Archives de Philosophie du Droit*, 27: 209–33.

Atkinson, A. B., Blanchard, O., Fitoussi, J.-P., Flemming, J., Malinvaud, E., Phelps, E. and Solow, R. (1992), *Premier rapport. La désinflation compétitive, le mark et les politiques budgétaires en Europe*. Groupe International de politique économique de l'OFCE. Paris: Ed. Le Seuil.

Béchillon (de), D. (1997), '*Qu'est-ce qu'une règle de droit?*' Paris: Ed. Odile Jacob.

Beffa, J.-L, Boyer, R., Touffut, J.-Ph. (1999), '*Employment Relationship in France: The State, The Firms and The Financial Markets.*' Paris: Saint-Simon Foundation.

Benassy, J.-P, Boyer, R., Gelpi, M., Lipietz, A., Mistral, J., Munoz, J., Ominami, C. (1977), '*Approches de l'inflation: l'exemple français.*' Paris: CEPREMAP-CORDES report.

Bessy, C. (2001), 'Is the Reproduction Expertise Limited by Tacit Knowledge? The Evolutionary Approach to the Firm Revised by the Distributed Cognition Perspective?'. WP Centre d'Etudes de l'Emploi, No 10.

Bourdieu, E. (1998), *Savoir Faire*. Paris: Ed. du Seuil.

Bourdieu, P. (1977), *Outline of a Theory of Practice*. Translated by Richard Nice. Cambridge: Cambridge University Press. (In French: *Esquisse d'une théorie de la pratique*. Paris, Droz, 1972, New Edition: 2000, Le Seuil).

Bourdieu, P. (1986), 'La force du droit', In *Actes de la Recherche en Sciences Sociales*. No. 64, Sept.: 3–19.

Bourdieu, P. (1990a), *The Logic of Practice*. Translated by Richard Nice. Cambridge. Polity Press. (In French: *Le Sens pratique*, 1980, Paris: Ed. de Minuit.)

Bourdieu, P. (1990b), *In Other Words. Essays Towards a Reflexive Sociology*. Translated by Mattew Adamson. Cambridge: Polity Press. (In French: *Choses dites*, 1987, Paris: Ed. de Minuit.)

Bourdieu, P. (2000), *Les Structures sociales de l'économie*. Paris: Le Seuil. (*The Social Structures of the Economy*. Forthcoming, Cambridge: Polity Press.)

Bouveresse, J. (1971), *La Parole malheureuse*. Paris: Ed. de Minuit.

Bouveresse, J. (1976), *Le Mythe de l'intériorité*. Paris: Ed. de Minuit.

Bouveresse, J. (1986), 'Le 'paradoxe de Wittgenstein' ou comment peut-on suivre une règle?'. In *Sud*, No. Hors série, 16: 11–55.

Bouveresse, J. (1987), *La Force de la règle*. Paris: Ed. de Minuit.

Bouveresse, J. (1995), 'Règles, dispositions et habitus', In *Critique*, August–September, No. 579–80: 573–94.

Boyer, R. (1978), 'Les salaires en longue période.' In *Economie et statistique*. No 103, Sept.: 27–57.

Boyer, R. (1994), 'Wages Reforms Imposed by the State: Some Paradoxes in French Incomes Policies.' In R. Dore, R. Boyer and Z. Mars (eds): 47–70.

Boyer, R. and Orléan, A. (1991), 'Les transformations des conventions salariales entre théorie et histoire'. In *Revue économique*, No. 2, Mar.: 233–72.

Boyer, R., Chavance, B. and Godard, O. (eds) (1991), *Les Figures de l'irréversibilité en économie*. Paris: Editions de L'EHESS.

Brown, W. (1962), *Piecework Abandoned: The Effect of Wage Incentive Systems on Managerial Authority*. London: Heinemann.

Brown, W. (1994), 'Incomes Policy in Britain: Lessons from experience'. In R. Dore, R. Boyer and Z. Mars (eds): 31–46.

Cahuc, P. and Zylberberg, A. (1996), *Economie du travail*. Paris, Bruxelles: De Boeck Université.

Caillé, A. (1994), 'A qui se fier ? Confiance, interaction et théorie des jeux'. In *Revue du MAUSS*, 4 (2): 17–36.

Carbonnier, J. (1983), *Flexible droit. Pour une sociologie du droit sans rigueur*. Paris: Librairie Générale de Droit et de Jurisprudence. 1st edition: 1969.

Chauviré, C. (1995), 'Des philosophies lisent Bourdieu. Bourdieu/Wittgenstein: la force de l'habitus'. In *Critique*, August–September, No. 579–80: 548–53.

Cohen, M. (1987), 'Adaptation of Organizational Routines'. *Workshop on Organizational Science*, MIT, June 10–12 .

Cohen, M. (1991), 'Individual Learning and Organizational Routine: Emerging Connections'. In *Organization Science*, 2 (1): 135–9.

Cohen, M., Burkhart, R., Dosi, G., Egidi, M., Marengo, L., Warglien, M. and Winter, S. (1996), 'Routines and Other Recurring Actions Patterns of

Organizations: Contemporary Research Issues'. In *Industrial and Corporate Change*, 5 (3): 653–98.
Cohen, M. and Bacdayan, P. (1994), ' Organizational Routines Are Stored as Procedural Memory: Evidence from a Laboratory Study'. In *Organization Science*, 5, Nov.: 554–68.
Cohendet, P. (1997), ' Apprentissage organisationnel et cohérence: l'importance économique de la notion de réseau'. In B. Reynaud (ed.) (1997): 73–98.
Cohendet, P., Kern, F., Mehmanpazir, B. and Munier, F. (1998), 'Routines, Structures of Governance and Knowledge-Creating Process'. In J. Lesourne and A. Orléan (eds), *Advances in Self-Organization and Evolutionary Economics*. London, Paris: Economica: 77–91.
Cohendet, P. and Steinmueller, W. (2000), 'The Codification of Knowledge: A Conceptual and Empirical Exploration'. In *Industrial Corporate Change*, 9(2), June: 195–209. (This special issue is edited by the authors).
Coleman, J. S. (1990), *Foundations of Social Theory*. Cambrigde (Mass.), Belknap Press of Harvard University Press.
Coriat, B. (1979), *L'Atelier et le chronomètre*. Paris: Ed. Christian Bourgois.
Cowan, R., David, P. A. and Foray, D. (2000), 'The Explicit Economics of Knowledge Codification and Tacitness'. In *Industrial and Corporate Change*, 9 (2), June: 211–253.
Cyert, R. M. and March, J. (1963), *A Behavioral Theory of the Firm*. Englewood Cliffs, Prentice Hall.
Daniel, J.-M. (1992), 'La politique salariale de l'Etat'. In *Observations et diagnostics économiques*, No. 42, Oct.: 77–93.
Dasgupta, P. (1988), 'Trust as Commodity'. In D. Gambetta (ed.): 49–72. (See ref.)
David, P. (1994), 'Why are Institutions the 'Carriers of History? Path Dependence and the Evolution of Conventions, Organizations and Institutions?'. In *Structural Change and Economic Dynamics*, 5(2): 205–20.
Debreu, G. (1974), 'Excess Demand Functions'. In *Journal of Mathematical Economics*, 1: 15–23.
Dore, R., Boyer, R. and Mars, Z. (eds) (1994), *The Returns to Incomes Policy*. London, New York: Pinter Publishers.
Dosi, G. and Egidi, M. (1991), 'Substantive and Procedural Uncertainty'. In *Journal of Evolutionary Economics*. vol. 1: 145–68.
Dosi, G., Freeman, Ch., Nelson, R., Silverberg, G. and Soete, L. (eds), (1988), *Technical Change and Economic Theory*. London: Francis Pinter.
Dosi, G., Marengo, L., Bassanini, A. and Valente, M. (1997), 'Les normes comme propriétés émergentes d'un apprentissage adaptatif'. In B. Reynaud (ed.), *Les Limites de la rationalité. Les Figures du collectif*, tome 2, Paris, Ed. La Découverte: 45–64.
Dosi, G. and Nelson, R. (1994), 'An Introduction to Evolutionary Theories in Economics'. In *Journal of Evolutionary Economics*, No. 4: 173–184.
Dosi, G., Teece, D. and Winter, S. (1990), 'Les frontières des entreprises: vers une théorie de la cohérence de la grande entreprise'. In *Revue d'économie industrielle*, No. 51, 1st quarter: 238–54.

Dosi, G., Teece, D. and Winter, S. (1992), 'Toward a Theory of Corporate Coherence: Preliminary Remarks'. In G. Dosi, R. Giannetti and P. A Toninelli (eds), *Technology, and Enterprise in a Historical Perspective*, Clarendon Press Oxford: 184–211.

Dumez, H. and Jeunemaitre, A. (1989), *Diriger l'Economie: l'Etat et l'économie, 1936–1986*. Paris: L'Harmattan.

Dupuy, J.-P., Eymard-Duvernay, F., Favereau, O., Orléan, A., Salais, R. and Thévenot, L. (1989), 'L'Economie des conventions'. *Revue Economique*, 40 (2), Mar.

Egidi, M. (1992), 'Organizational Learning, Problem Solving and the Division of Labour'. In M. Egidi and R. Marris (eds) *Economics, Bounded Rationality and the Cognitive Revolution*. Edward Elgar: 148–73.

Egidi, M. (1996), 'Routines, Hierarchies of Problems, Procedural Behavior: Some Evidence From Experiments'. In Arrow, K. J., and The International Economic Association, (eds). *The Rational Foundations of Economic Behaviour*. IEA Conference Volume, no. 114. New York: St. Martin's Press; Houndmills, Basingstoke: Macmillan Press: 303–33.

Egidi, M. and Narduzzo, N. A. (1997), 'The Emergence of Path-Dependent Behaviors in Cooperative Contexts'. In *International Journal of Industrial Organization*, 15 (6) Oct.: 677–709.

Eymard-Duvernay and Thévenot, L. (1983), 'Les investissements de forme'. *Document de travail*, INSEE.

Faugère, J.-P. (1988), *Les Politiques salariales en France*. Paris, La Documentation Française.

Faugère, J.-P. (1994a), 'L'intervention de l'Etat sur les salaires: anciennes et nouvelles approches théoriques'. In *Economie Appliquée,* tome XLVI, (3): 131–67.

Faugère, J.-P. (1994b), 'L'Etat et la formation des salaires en Europe: logique de marché et logique politique'. In *Revue Française d'Economie,* vol. IX, Winter: 41–76.

Faugère, J-P. (1994c), 'La redéfinition du rôle de l'Etat, induite par la construction Européenne'. In B. Bellon, Caire, G., Cartelier, L., Faugère, J.-P. and Voisin, C., *L'Etat et le marché*. Paris: Economica: 94–103.

Feldman, M. S. (2000), 'Organizational Routines as a Source of Continuous Change'. In *Organization Science*, 11(6): 611–29.

Feldman, M. S. and Rafaeli, A. (2002), 'Organizational Routines as Sources of Connections and Understandings'. In *Journal of Management Studies*, forthcoming May.

Féroldi, M. and Meunier, F. (1984), 'La boucle prix-salaires et l'inflation depuis 1970'. In *Economie et statistiques,* No 169, Sept.: 45–59.

Festinger, L. (1957), *A Theory of Cognitive Dissonance*. Stanford: Stanford University Press.

Fonteneau, A. and Muet, P-A. (1985), *La Gauche face à la crise*. Paris: Presses de la Fondation Nationale des Sciences Politiques.

Ford, H. (1922), *My Life and Work*. In collaboration with Samuel Crowther. London: William Heinemann.

Gambetta, D. (ed.) (1988), *Trust: Making and Breaking Cooperative Relations*. Oxford: Basil Blackwell.

Garnier, O. (1986), 'La théorie néo-classique face au contrat de travail: de la 'main invisible' à la poignée de main invisible'. In R. Salais and L. Thévenot (eds) *Le Travail. Marchés, règles, conventions*. Paris: INSEE-Economica: 313–31.
Gersick, C. and R. Hackman (1990), 'Habitual Routines in Task-performing Groups'. In *Organizational Behavior and Human Decision Processes*, vol. 47: 65–97.
Gibbons, R. (1987), 'Piece-Rate Incentive Schemes'. In *Journal of Labor Economics*, 5(4) Part (1), October: 413–29.
Gibbons, R. (1998), 'Incentives in Organizations'. *National Bureau of Economic Research Working Paper Series*, Aug.
Granovetter, M. (1985), 'Economic and Social Structure: the Problem of Embeddedness'. In *American Journal of Sociology*, 91 (3): 481–510.
Grefffe, X. (1993), *Comprendre la politique économique*. Paris: Economica.
Grossman, S. and Hart, O. (1986), 'The Costs and Benefits of Ownership: A Theory of Vertical Integration'. In *Journal of Political Economy*, 94: 691–719.
Gruson, C. (1976), *Programmer l'espérance*. Paris: Stock.
Hart, H. (1961), *The Concept of Law*. London: Oxford University Press.
Hen, C. and Léonard, J. (1995), *L'Union européenne*. Paris: La Découverte, coll. Repères.
Hénin, P.-Y. (ed.) (1987), *L'Indexation des salaires. Fondements et implications macroéconomiques*. Paris: Economica.
Hirschman, A. (1970), *Exit, Voice, Loyalty*. Cambridge, Mass.: Harvard University Press.
Holmström, B. (1979), 'Moral Hazard and Observability'. In Bell Journal of Economics, 10: 74–91.
Holmström, B. and Milgrom, P. (1994), 'The Firm as an Incentive System'. In *American Economic Review*. 84 (4), Sept.: 972–91.
Holtzman, S. and Leich, C. (eds) (1981), *Wittgenstein: To Follow a Rule*. London: Routledge.
Husson, M. (1990), 'Le rétablissement du profit dans l'industrie française. Une analyse sectorielle. 1983–1988'. In *La revue de l'IRES*, No. 4, Autumn: 3–24.
Hutchins, E. (1991), 'Organizing Work by Adaptation'. In *Organization Science*, 2(1), Feb.: 14–39.
Hutchins, E. (1994), 'Comment le 'cockpit' se souvient de ses vitesses'. In *Sociologie du Travail* No. 4: 451–73.
Industrial and Corporate Change (2000), Special Issue on *The Economics of Knowledge*, 9 (2) June.
INSEE, (1988), *La croissance retrouvée, Rapport sur les comptes de la Nation 1988*. Paris, Imprimerie Nationale.
Jeammaud, A. and Lyon-Caen, A. (1982), 'Droit et direction du personnel'. In *Droit Social*, No. 1, Jan.: 56–69.
Jeanneney, J. M. (dir.), (1987), *L'Economie française depuis 1967. La traversée des turbulences mondiales*. Paris: Le Seuil.
Jobert, B. (ed.) (1994), *Le Tournant libéral en Europe*. Paris: L'Harmattan.
Jobert, B. and Muller, P. (1987), *L'Etat en action. Politiques publiques et corporatismes*. Paris: Presses Universitaires de France.

Jobert, B., Théret, B. (1994), 'La France: consécration républicaine du néo-libéralisme'. In *Le Tournant libéral en Europe,* sous la direction de B. Jobert. Paris: L'Harmattan: 21–85.
Jones, S. (1984), *The Economics of Conformism*. Oxford: Basil Blackwell Publisher.
Karpik, L. (1989), 'L'économie de la qualité'. In *Revue Française de Sociologie,* XXX-2, April-June: 187–210.
Karpik, L. (1996), 'Dispositifs de confiance et engagements crédibles'. In *Sociologie du travail,* No. 4: 527–50.
Kreps, D. (1990), ' Corporate Culture and Economic Theory'. In J. E Alt and K. A. Shepsle (eds), *Perspectives on Positive Political Economics*. Cambridge: Cambridge University Press: 90–143.
Kripke, S. A. (1982), *Wittgenstein on Rules and Private Language*. Oxford: Basil Blackwell.
Lallement, M. (1996), *Sociologie des relations professionnelles*. Paris: La Découverte, coll. Repères.
Lambrou, F. (1964), *Pratique des observations instantanées*. Paris: Entreprise Moderne d'Edition.
Lassègue, J. (1994), *L'Intelligence artificielle et la question du continu*. Thèse de Doctorat (Philosophie), Paris X-Nanterre, in particular Cf. Ch. 2, 'Présentation classique de la notion de calculabilité': 49–87.
Laufer, R. and Orillard, M. (eds) (2000), *La Confiance en question*. Paris: L'Harmattan, coll. Logiques Sociales.
Lazaric, N. and Lorenz, E. (eds), (1998), *The Economics of Trust and Learning*. Edward Elgar.
Lazear, E. P. (1979), 'Why Is There Mandatory Retirement?'. In *Journal of Political Economy*, 87 (6). Dec.: 1261–84.
Leibenstein, H. (1982), 'The Prisoners' Dilemma in the Invisible Hand: An Analysis of Intrafirm Productivity'. In *American Economic Review*. 72 (2), May: 92–7.
Lewis, A. (1988), 'Wittgenstein and Rule-Scepticism'. In *Philosophical Quarterly*, vol. 38, Issue 152, July: 280–304.
Lewis, D. (1969), *Convention: A Philosophical Study*. Harvard: Harvard University Press.
Livet, P. (1994), *La Communauté virtuelle*. Combas: Editions de l'Eclat.
Livet, P. and Reynaud, B. (1998), 'Organisational trust, Learning and Implicit Commitment' in N. Lazaric and E. Lorenz (eds): 266–84.
Llerena, P. (2000), 'Incitation, création de connaissance et accords de coopération interorganisation', with M. Matt and S. Wolff in *La coopération industrielle,* B. Bellon, Plunket, A. and Voisin, C., (eds). Paris: Economica: 109–24.
Lordon, F. (1995), 'Analyse d'un régime de politique économique: le cas de la désinflation compétitive'. *Document de travail.* CEPREMAP, May.
Lordon, F. (1997), *Les Quadratures de la politique économique*. Paris: Albin Michel.
Loué, J.-F. and Morin, P. (1986), 'La boucle prix-salaires des modèles de l'économie française: structure et robustesse'. In *Revue Economique,* 37, (6): 1067–92.
Magaud, J. and Sugita, K. (1991), 'France-Japon. Un produit, deux façons de faire'. *Dossier de Recherche*, No 43, Centre d'Etudes de l'Emploi.

Malerba, F. and Orsenigo, L. (2000), 'Knowledge, Innovative Activities and Industrial Evolution'. In *Industrial and Corporate Change*, 9 (2), June: 289–314.
Malinvaud, E. (1982), 'Nouveaux développements sur la théorie macroéconomique du chômage'. In *Revue Economique*, Jan. 1978. In Mairesse, J. (ed.) (1982), *Emploi et chômage*. Paris, Presses de la Fondation Nationale des Sciences Politiques: 9–25.
Mantel, R. (1974), 'On the Characterisation of Aggregate Excess Demand'. In *Journal of Economic Theory*, 7: 348–53.
March, J. (1975), 'Bounded Rationality, Ambiguity, and the Engineering of Choice'. In *Bell Journal of Economics*. Vol. 9 (2): 587–608. (Also published in March, J. (1988), Decisions and Organization. Oxford and New York: Basic Blackwell.)
March, J. and Simon, H. (1958), *Organizations*. New York: John Wiley and Sons.
March, J., Schulz, M. and Zhou, X. (2000), *The Dynamics of Rules. Change in Written Organizational Codes*. Stanford: Stanford University Press.
Marengo, L. (1992), 'Structure, Competence and Learning in an Adaptive Model of the Firm'. *Papers on Economics and Evolution*, No. 9203.
Marsden, D. (1999), *A Theory of Employment Systems. Micro-Foundations of Social Diversity*. Oxford: Oxford University Press.
Marx, K. (1867), *Capital*. New York: International Publishers (1967). Vol. 1.
Mayer, P. (1973), *La Distinction entre règles et décisions et le droit international privé*. Paris: Dalloz.
Meurs, D. (1996), *Articulation des négociations salariales de branche et des négociations d'entreprise*. Convention d'étude ERMES-DARES-DRT, final Report, 29 Feb.
Minczeles, A. and Sisciz, P. (1986), 'La désinflation 1982–1985. Une analyse variantielle'. In *Revue Economique*, 37 (6), Nov.: 1127–46.
Morin, P. (1988), 'Une analyse du processus de désinflation'. In *Economie et Prévision,* 82(1): 1–71.
Moscovici, S. (1976), *Social Influence and Social Change*. London: Academic Press.
Moscovici, S. (ed.) (1984), *Psychologie sociale*. Paris: Presses Universitaires de France.
Nasse, P. (1988), 'Salaires et politique salariale'. In *Mélanges économiques. Essais en l'honneur de Edmond Malinvaud.* Paris: Economica – EHESS: 832–59.
Nelson, R. (1994), 'Routines'. In *The Elgar Companion to Institutional and Evolutionary Economics*. London: Edward Elgar, Tome 2: 249–53.
Nelson, R. (1995), 'Recent Evolutionary Theorizing About Economic Change', *Journal of Economic Literature*, vol. XXXIII, Mar.: 48–90.
Nelson, R. and Winter, S. (1982), *An Evolutionary Theory of Economic Change*. Harvard University Press.
Newell, A. and Simon, H. (1972), *Human Problem Solving*. Englewood Cliffs, NJ: Prentice Hall.
OFCE, (1996), *L'Economie française 1996*. Paris: La Découverte, coll. Repères.
Ohno, T. (1989), *L'esprit toyota*. Paris: Masson. [Translation from the Japanese edition of 1978.]
Orléan, A. (1988), 'L'auto-référence dans la théorie keynésienne de la spéculation'. In *Cahiers d'Economie Politique*, 14–15: 229–42.

Orléan, A. (1994), 'Sur le rôle respectif de la confiance et de l'intérêt dans la constitution de l'ordre marchand'. In A. Caillé (ed.), *A qui se fier*? Revue du MAUSS, No. 4: 17–36.
Orléan, A. (ed.), (1994), *Analyse économique des conventions*. Paris: Presses Universitaires de France.
Paichelier, G. and Moscovici, S. (1984), 'Suivisme et conversion'. In Moscovici, S. (ed.) (1984): 139–66.
Patat, J.-P. (1992), *L'Europe monétaire*. Paris, La Découverte, coll. Repères.
Pentlab, Brian (1995), 'Grammatical Models of Organizational Process'. In *Organization Science*, 6 (5): 541–56.
Pentlab, B. and Rueter, H. (1994), 'Organizational Routines as Grammar of Actions'. In *Administrative Science Quarterly*, vol 39: 484–510.
Piore, M., Lester, M., Kofman, F. and Malek, K. (1994), 'The Organization of Product Development'. In *Industrial and Corporate Change*, vol. 3(2): 405–34.
Polanyi, M. (1967), *The Tacit Dimension*. Garden City, NY: Doubleday Anchor.
Raff, M. G. (1988), 'Wage Determination Theory and the Five-Dollar Day at Ford'. In *Journal of Economic History*, vol. 48, Issue 2, 'The Tasks of Economic History', June: 387–99.
Ralle, P. and Toujas-Bernate, J. (1990), 'L'Indexation des salaires: la rupture de 1983'. In *Economie et Prévision,* Nos 92–93: 187–93.
Ralle, P. (1987), 'Les déterminants macroéconomiques du taux de salaire ont-ils changé depuis 1982?', *Note INSEE*, 14 April.
RATP, (2000), 'Le matériel métro: du Sprague-Thomson au MF 2000'. *Les Cahiers de la mémoire*. RATP (Ed.), No. 12.
Rawls, J. (1955), 'Two Concepts of Rules'. In *The Philosophical Review*, vol. 64, Issue 1, Jan.: 3–32.
Reynaud, B. (1987), *Le Modèle hiérarchique: une méthode d'analyse des relations salariales*. Thèse pour le doctorat d'Etat ès sciences économiques, Université de Paris-X Nanterre.
Reynaud, B. (1988), 'Le contrat de travail dans le paradigme standard'. In *Revue Française d'Economie*, 3 (4), Autumn: 157–94.
Reynaud, B. (1992), *Le Salaire, la règle et le marché*. Paris: Christian Bourgois.
Reynaud, B. (1996), 'Types of Rules, Interpretation and Collective Dynamics: Reflections on the Introduction of a Salary Rule in a Maintenance Workshop'. In *Industrial Corporate Change*, 5(3): 699–721.
Reynaud, B. (ed.). (1997), *Les Limites de la rationalité. Les Figures du collectif*, tome 2. Paris: La Découverte.
Reynaud, B. (2000), 'The Properties of Routines: Tools of Decision Making and Modes of Collective Coordination'. In P. Saviotti and B. Nootebaum (eds), *Technology and Knowledge: from the Firm to Innovation Systems*. London: Edward Elgar: 249–62.
Reynaud, B. and Najman, V. (1992), *Les Règles salariales au concret: enquête auprès des grandes entreprises*. Paris: La Documentation française.
Rials, S. (1980), *Le Juge administratif et la technique du standard*. Paris, Librairie Générale de Droit et de Jurisprudence.
Rowe, N. (1989), *Rules and Institutions*. New York: Philip Allan.
Salais, R. and Thévenot, L. (1986) (eds), *Le Travail. Marchés, règles et conventions*. Paris: INSEE-Economica.

Saviotti, P. and Metcalfe, J. (eds), (1991), *Evolutionary Theories of Economic and Technological Change*. Harvard Academic Publishers.
Schwyzer, H. (1969), 'Rules and Practices'. In *The Philosophical Review*, 78 (4), Oct.: 451–67.
Searle, J. (1964), 'How to derive "Ought" From Is'. In *The Philosophical Review*, vol. 73 (1) Jan.: 43–58.
Searle, J. (1969), *Speech Acts. An Essay in Philosophy of Language*. Cambridge: Cambridge University Press.
Sen, A. (1979), 'Rational Fools: A Critique of the Behavioural Foundations of Economic Theory'. In F. Hahn and M. Hollis (eds). *Philosophy and Economic Theory*. New York: Oxford University Press: 89–109.
Serverin, E. (2000), 'Agir selon les règles dans la sociologie de Max Weber'. In E. Serverin and A. Berthoud (eds), *La Production des normes entre Etat et société civile*. Paris: L'Harmattan: 209–35.
Shapiro, C. and Stiglitz, J. (1984), 'Equilibrium Unemployment as a Worker Discipline Device'. In *American Economic Review*, 74(3), June: 433–44.
Simon, H. (1951), 'A Formal Theory of the Employment Relationship'. In *Econometrica*, 19(3): July: 293–305.
Simon, H. (1976), 'From Substantive to Procedural Rationality'. In S. J. Latsis (ed.), *Method and Appraisal in Economics*. Cambridge: Cambridge University Press: 129–48.
Sonnenschein, H. (1973), 'Do Walras Identity and Continuity Characterize the Class of Excess Demand Functions?' In *Journal of Economic Theory,* 6: 345–54.
Spence, M. (1973), 'Job Market Signalling'. In *Quarterly Journal of Economics*, Vol. LXXXVII, No. 3, Aug.: 355–74.
Spence, M. (1974), *Market Signalling: Informational Transfer in Hiring and Related Screening Process*. Cambridge: Harvard University Press.
Stiglitz, J. (1974), 'Alternative Theories of Wage Determination and Unemployment in LDC's: The Labor Turnover Model'. In *Quarterly Journal of Economics*, 88 (2): 194–227.
Stiglitz, J. (1975), 'Incentives, Risk, and Information: Notes Towards a Theory of Hierarchy'. In *Bell Journal of Economics*, vol. 6: 552–72.
Stinthcombe, A. (1990), *Information and Organization*. Berkeley: University of California Press.
Taylor, C. (1992), 'To Follow a Rule' In M. Hjort (ed.), *Rules and Conventions*. London: The John Hopkins University Press: 167–85.
Taylor, F. W. (1911), *The Shop Management*. New York: Harper and Brother; 1st edition: 1903.
Théret, B. (1996), 'Politique économique et régulation. Une approche topologique et autopoiétique', Mimeo.
Thévenot, L. (1986), 'Les investissements de forme'. In *Conventions Economiques*. Centre d'Etudes de l'Emploi- Presses Universitaires de France: 21–72.
Vanberg, V. (1993), 'Rational Choice, Rule Following and Institutions. An Evolutionary Perspective'. In Maki, U., Gustafsson, B. and Knudsen, C., *Rationality, Institutions and Economic Methodology*. London: Routledge: 171–200.
Vanberg, V. (1994), *Rule and Choice in Economics*. London and New York: Routledge.

Virally M. (1960), *La Pensée juridique*. Paris: Librairie Générale de Droit et de Jurisprudence.
Walliser, B. and Zwirn, D. (1997), 'Les règles de révision des croyances' In J.-P. Dupuy and P. Livet (eds), *Les Limites de la rationalité. Rationalité, éthique et cognition*, tome 1. Paris: Ed. La Découverte: 191–208.
Weber, M., (1922), *Gesammelte Aufsätze zur Wissenschaftslehre*. Tübingen: JCB Mohr, 1973.
Weber, M. (1992), *Essais sur la théorie de la science*. Paris: Presses Pocket. (Traduit de l'allemand par Julien Freund. First edition: 1951.)
Weiss, H. and Ilgen, D. (1985), 'Routinized Behavior in Organizations'. In *Journal of Behavioral Economics*, vol. 14: 57–67.
Weitzman, M. (1985), 'The Simple Macroeconomics of Profit Sharing'. In *American Economic Review*. Dec., 75 (5): 938–53.
Williamson, O. E. (1975), *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: The Free-Press, London: Macmillan.
Williamson, O. E. (1993), ' Calculativeness, Trust, and Economic Organization'. In *Journal of Law and Economics*, vol. XXXVI, April: 453–487.
Williamson, O. E. (1995), 'Hierarchies, Markets and Power in the Economy: An Economic Perspective'. In *Industrial and Corporate Change*. 4 (1): 21–49.
Winter, S. (1986), 'The Research Program of the Behavioral Theory of the Firm'. In B. Glad and S. Kaish (eds), *Handbook of Behavioral Economics*. Vol. A. London: JAI Press Inc: 151–88.
Winter, S. (1995), 'Four Rs Profitability: Rents, Resources, Routines and Replication'. In C. Montgomery (ed.), *Resource-Based and Evolutionary Theories of the Firm: Toward a Synthesis*. Kluwer Academic Publishers, Hingham, MA: 147–77.
Wittgenstein, L. (1953), *Philosophical Investigations*. Oxford: Basil Blackwell.
Wittgenstein, L. (1958), *Remarks on the Foundations of Mathematics*, G. E. M. Anscombe, R. Rhess and G. H. Von Wright (eds), Oxford: Basic Blackwell.
Wittgenstein, L. (1964), *Philosophical Remarks*. Oxford: Basil Blackwell.
Wittgenstein, L. (1979), *Wittgenstein's Lectures, Cambridge 1932–1935*, A. Ambrose (ed.), Oxford: Basil Blackwell Publishers.
Wittgenstein, L. (1997), *Dictées de Wittgenstein à Friedrich Waismann et pour Moritz Schlick*. *Textes inédits*, Tome 1. A. Soulez, (dir.) Paris: Presses Universitaires de France.
Young, P. (1993), 'The Evolution of Conventions'. In *Econometrica*, 61 (1), Jan.: 57–84.
Young, P. (1996), 'The Economics of Convention'. In *Journal of Economic Perspectives*, 10 (2), Spring: 105–122.

Abbreviations used for Wittgenstein's books

BGM Wittgenstein, L. (1958), *Bemerkungen über die Grundlagen der Mathematik*, Oxford: Basic Blackwell. [*Remarks on the Foundations of Mathematics*. Oxford: Basic Blackwell.]
PU Wittgenstein, L. (1953), *Philosophische Untersuchungen*. [*Philosophical Investigations*. Oxford: Basil Blackwell.]

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