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Control in Multinational Firms: An Economic Perspective

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Control in Multinational Firms: An Economic Perspective

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Abstract

This paper uses principal-agent and transaction cost theories to analyze the concept of control in multinational enterprises. One of the main points is the distinction between methods of organization (the price system and hierarchy) and economic institutions (markets and firms), which use both methods of organization. I argue that the price system and hierarchy are substitutes, with the price system utilized in firms to overcome the basic flaws of hierarchy. This theoretical framework is then used to analyze some of the relationships studied in the organization theory literature of the MNE.

1. Introduction

How do firms manage to efficiently perform their functions? How do they constrain individual behavior to make it compatible with the overall goals of the firm? This question has been of particular interest to students of the multinational enterprise (MNE) (see for example Brooke and Remmers, 1970; Pralahad and Doz, 1981; Doz and Pralahad, 1981; Hedlund, 1981, 1986; Welge, 1987; Baliga and Jaeger, 1984; Egelhoff, 1988; Gates and Egelhoff, 1986; Bartlett, 1986; Bartlett and Goshal, 1989). This is because the problem of control is particularly acute in MNEs. Geographical and cultural distance increase the cost of establishing control, and many MNEs have found it difficult to obtain the cooperation of their foreign affiliates. Over-centralization of decisions leads to paralysis, while excessive decentralization results in chaos (Doz and Pralahad, 1981).

The issue of control in MNEs has elicited a considerable volume of empirical research. A recent survey of coordination mechanisms in MNEs lists 85 empirical studies undertaken since 1953 (Martinez and Jarillo, 1989). Yet, in spite of this significant effort, our knowledge of control mechanisms in firms is still fragmentary. For example, on one of the most salient issues, that of the determinants of centralization (the extent to which decisions are taken at the headquarters of the MNE), "researchers have generated inconsistent hypotheses... and reported inconsistent results" (Gates and Egelhoff, 1986, p. 72).

The goal of this paper is threefold. First, I intend to sketch a theoretical structure to clarify some of the concepts used in the study of coordination mechanisms in firms. One of the main building blocks of this framework is the distinction between methods of organization (the price system and hierarchy) and economic institutions (markets and firms) which use both of these methods. Another is the argument that price systems and hierarchy use different methods of organization which are substitutes. Hence the price system can be used in firms to overcome the basic flaws of hierarchy, and vice versa. This theoretical framework will then be used to analyze some of the relationships studied in the organization theory literature of the MNE, for example that between the degree of centralization and the extent of interdependencies between the parent and its foreign affiliates. I will show how the framework developed here explains some of the paradoxical results found in previous studies. Lastly, I will suggest some directions for further research.

The model presented below, based on Hennart (1982), draws from both transaction cost and agency theory, but differs to some extent from both. It posits that organizations are designed to minimize the cost of organizing exchange and cooperation, and that competition in the product and factor markets leads individuals to organize themselves under the form of organization that minimizes these costs.

2. A Theory of Economic Organization

The major insight of transaction cost theory is that firms and markets are alternative institutions devised to organize economic activities. To

understand the nature of organizational processes within firms one must ask two separate questions: First, what must be done to organize economic activities, that is, what are the tasks that both firms and markets must perform? Second, how do firms differ from markets in the way they perform these tasks?

2.1 What is involved in organizing economic activities?

Economic institutions (such as firms and markets) exist to organize cooperation. Cooperation between economic individuals can be productive for two reasons. First, some tasks require more capabilities than can be provided by a single individual, and consequently can only be achieved by pooling the efforts of more than one person. Individuals have also differing abilities, and trade allows individuals to exploit those differences by making it possible for each to specialize in tasks for which they have a comparative advantage. In both cases the utility that individuals receive from cooperating is greater than what they could achieve through their solitary effort.

Although cooperation is productive, achieving it is not costless: first, individuals must be told that their interaction will be profitable; second, their effort to extract all of the gains from cooperation must be curbed (some sharing rule must be imposed on them); thirdly, the sharing rules must be enforced. Failing this, cooperation would not take place or would not last. For example, if there is no sharing rule which imposes itself on cooperators, they can be expected to bargain to increase their share. In the process, they may invest more resources in bargaining than would be available if they cooperated. Achieving cooperation requires therefore carefully devised

techniques that reduce information, bargaining, and enforcement costs. These costs (which we call "organizing costs") arise from man's "bounded rationality" and from his "opportunism", i.e. his self-seeking behavior.

Neoclassical economics assumes that the three tasks that must be performed to obtain cooperation are performed costlessly in firms as well as in markets. What economists call "the theory of the firm" starts by assuming that this problem is solved (Alchian and Demsetz, 1972). In reality, all economic institutions experience costs in performing these three tasks. At any point in time, some potential gains of cooperation will be foregone because the gains from such cooperation are too small to warrant the establishment of institutions to organize it. Individuals will have to give up the gains of trade and specialization, and we will observe subsistence farming, self-insurance, and home production of clothing and food. The greater the potential gains from trade, the larger the amount of resources expended to achieve cooperation.

2.2 Prices and Hierarchy are Two Alternative Methods of Organization

It is important at the outset to distinguish between "method of organization" and "economic institution". The price system and hierarchy are alternative methods that can be used to organize economic activities. They are alternative in the sense that they use different methods of organization, which result in different biases. Consequently, they experience, for a given interaction (transaction), different levels of organizing costs. Each mode will therefore have a comparative advantage in organizing a particular set of transactions.[1] Firms and markets are economic institutions. These institutions

generally use a mix of both methods of organization, although the mix in firms is heavily biased towards hierarchy, while markets predominantly use the price system. As we will show, the choice between organizing a transaction within the firm or having it organized through the market (the make-or-buy decision) is a choice between using the price system and using hierarchy. The same analysis can be used to decide whether to organize an activity within a firm through prices or through hierarchy.

Let us first consider how the price system and hierarchy are viable ways of organizing cooperation. To simplify the exposition, it is assumed that there are zero transaction costs. This makes it possible to distinguish between the method of organization used and the actual performance of these methods of organization when organizing costs are positive.

We have seen that the organizing exchange and cooperation requires that individuals be informed of their interdependence, rewarded for cooperating, and discouraged from bargaining. Prices can perform these three tasks. Prices inform individuals about opportunities for cooperation. The information structure of a market is fully decentralized, with each party receiving through prices information on every one else's needs and desires, and adapting to it in a way that maximizes social (and individual) utility.[2] Prices also act as sharing rules that allocate the gains from cooperation. When markets function perfectly (i.e. when there is a large number of buyers and sellers), these sharing rules become exogenous. Individuals do not have the power to change them, and bargaining is discouraged. Prices also meter and reward perfectly an agent's behavior. The gross rewards that individuals receive is directly function of their output times market prices.

In the absence of organizing costs, another method of organization, which we call hierarchy, would also perfectly organize economic activities. We define hierarchy as a method of organization, and hence "hierarchy" is not synonymous with "firm" nor with "upper managers". Hierarchy is defined here as a method of organization that is characterized by centralized information and the use of behavior constraints. Hence our definition of hierarchy differs significantly from its current usage (as in Hedlund's piece in this volume). While information is decentralized with prices, it is centralized with hierarchy. The hierarchical method of organization channels all the information possessed by individuals (employees) to a central party, the boss, who assimilates all of the information dispersed in the system, draws consistent plans, and retransmits it to employees in the form of directives. If individuals have "unbounded rationality", this is as efficient a method of making optimal joint decisions as the decentralized system of market prices.

A price system has individuals collect their own information and make their own productive decisions, and they are rewarded by their output measured at market prices. By contrast, under hierarchy the agent relinquishes to a central party, the boss, his right to make decisions concerning the allocation of his own resources (such as his labor-time and effort), and instead agrees to do as told, within the constraints established by social custom. Why do employees agree to have their behavior directed by the boss? Because their reward under hierarchy is independent of their output. They are therefore less concerned about being ordered to perform tasks that do not seem to maximize their income. A hierarchical system does not reward employees by their output

measured at market prices, but by their obedience to managerial directives. In other words, firms use behavior constraints: employees are paid a fixed amount for following orders. Employees will be less concerned about the allocation of their resources, for they will not bear the monetary consequences of such allocation. In the absence of organizing costs, direction of tasks will then be easily performed by fiat.

2.3 Markets and firms in the presence of positive organizing costs

In the real world, both the price system and hierarchy will experience costs in organizing economic activities. But because these two methods are fundamentally different, they will experience different levels of organizing costs for a given transaction.

A real-life price system experiences costs in informing parties, in curbing bargaining, and in enforcing sharing rules. These costs have been called (market) transaction costs. Let us first consider the costs incurred by a price system in informing parties, before turning to those involved in enforcing the terms of transactions.

Information

The price system works by communicating information to all interacting parties. That information must by necessity be compact, for otherwise the information needs of the system would be overwhelming. In a society consisting of n independent parties, organizing activities through prices requires 1/2(n2-n) two-way communication channels, as every individual must communicate with all others. By contrast, only n two-way channels are required in a

hierarchy, where all messages are channelled through a central party (Williamson, 1970, p. 20). Whenever price information has to be supplemented by complex descriptions, transferring exhaustive information to all parties would be exceedingly costly. As Arrow (1974) point out, prices are concentrated information: in one number is expressed all that is needed for parties to adapt. But this presupposes that the characteristics of the goods are known to all. Knowing that grade A butter is 4 dollars a pound or that virgin aluminium grade P1020A is 65 cents a pound is useful to guide behavior; knowing that cars are 50 cents a pound or that master paintings are 5 $ the square inch is not. This is because the latter two goods have an infinite variety of attributes. With bounded rationality, individuals will not have a perfect knowledge of the characteristics of goods transacted. Prices will no longer perfectly describe goods in all of their dimensions. In some cases, they will provide "wrong" signals that will mislead economic individuals, leading them to overconsume (underproduce) underpriced goods and underconsume (overproduce) overpriced ones.

When prices fail to act as efficient guides to behavior, a decentralized system may be efficiently replaced by a centralized one. A decentralized system requires individuals to gather all of the information they need. If the compact information provided by prices needs to be supplemented by extensive additional information, then centralizing information is efficient. It may be desirable to specialize each individual in the collection of a limited type of information, and to ask him to transfer the information to a central party. The central party can then synthesize that information, make decisions, and send directives for execution. This is the essence of the hierarchical solution.

The benefits of hierarchy are especially noticeable when the environment is changing rapidly. The hierarchical method of organization concentrates all information and decision-making in a top coordinator. Decisions concerning what is to be done can be imposed by fiat, because the allocation of tasks has little impact on an employee's income (which is independent of output). The price system, on the other hand, rewards parties in proportion to their output. When the price system works perfectly, prices are exogenous and bargaining is impossible. In conditions of imperfect competition, prices are no longer exogenous, and parties to the exchange will resist changes detrimental to their interest unless they are fully compensated. The time spent communicating the information to all concerned parties and resolving disputes may be such as to make adjustment impossible: by the time an agreement is reached, further adjustment may be needed. Hierarchy in more efficient in this respect, as the central coordinator can quickly respecify the system through fiat (Williamson, 1975).

There are, however, two major problems with the hierarchical solution. First, information collection and decision-making are now dissociated. Individuals often acquire idiosyncratic information in the course of their activities. In a price system, they can be expected to use this information to increase their income (Hayek, 1945, p. 521). Under a hierarchical one, employees have less incentive to become informed and to transmit such information because they will not be directly rewarded for doing so.[3] Even if employees faithfully transmit upwards everything that they observe, information will be lost as it is transferred across hierarchical levels. The

information loss may be voluntary or involuntary. Involuntary distortion results from encoding/decoding gaps (Williamson 1970). Distortion may also be voluntary because employees can be expected to distort information in ways that benefit them. The greater the size of the firm and hence, for a given span of control, the greater the number of hierarchical levels, the higher the information losses incurred by hierarchy.

Enforcement

Prices will provide appropriate signals to guide behavior if they reflect the social value of goods and services. In reality, bounded rationality will make measurement costs positive. Because of diminishing returns to measurement activity, it will not pay to measure outputs perfectly. Traders will incur enforcement costs up to the point where the marginal cost of enforcement is equal to the marginal gain from better measurement. Consequently, it will be possible for market participants to alter the terms of trade to their advantage within that range without a corresponding loss of revenues. In other word, the high costs of measurement will make it possible for individuals to cheat. Individuals will supply too little of what is desired and too much of what is not. Hence the costs of a price system (from the point of view of the reward function) will be the cost of measuring output plus the cost of cheating that will result from imperfect measurement. We call these "cheating" costs.

One way to reduce cheating is to reduce the incentive that the seller has to cheat, i.e to make his income (i.e his output times market prices) independent of his behavior. As we have seen above, this is the essence of the

hierarchical solution. This solution, however, has the unavoidable consequence of reducing the employee's incentive to apply his initiative and effort (at least as long as effort enters his utility function with a negative sign).

The point is best made with an example. Consider a farmer that contracts for a fixed price to have fertilizer spread on his field. One important dimension of performance is the uniformity of application. If the fertilizer has not been uniformly applied, the crop in parts of the field may suffer burns, while in others it may fail to grow. One way to protect against this eventuality would be to carefully measure performance. In this instance, the farmer could sample parts of the field after application and calculate the weight of fertilizer per square yard. This, however, is likely to be very costly as the fertilizer may quickly dissolve into the ground. Since an even application of fertilizer takes more time and effort than an uneven one, a subcontractor who is paid a fixed amount for the job will be incited, if detection is costly, to apply fertilizer in an uneven way.[4] In this case, the cost of transacting on the market (from an enforcement point of view) is the cost of measuring performance plus the cost due to cheating (the cost to the farmer of a reduced crop due to uneven application).

Where, as in the case above, the cost of measuring output and the consequences of imperfectly doing it are substantial, it may be cheaper for both parties to use a different method of organization, hierarchy. Rather than expend resources to measure output, it may be desirable to change the behavior of individuals by reducing the incentives they have to cheat. This can be done by breaking the connection between output and rewards. In our case, the farmer can hire the subcontractor who applies fertilizer and promise him a fixed sum

of money per unit of time, on condition that he follows his orders. Now that his salary is no longer function of his output per unit of time, the farm hand has less incentive to spread fertilizer unevenly.

One unavoidable consequence of this decoupling is that, while it reduces cheating, it also reduces incentives to work. A self-employed individual (i.e an agent constrained by prices) who slacks or decides to take the day off pays the full cost of his behavior in the form of reduced income. When rewards are no longer proportional to performance (as measured on the market), employees will have incentives to shirk, i.e. to break the promises they made to obey managerial directives. How much shirking will take place will depend on the extent to which the employee's objectives differ from those of the employer. For example, with a non-zero disutility of effort, employees will have incentives to reduce the effort they devote to their tasks. Note that shirking does not necessarily mean loafing: it can involve doing the work too well. More generally, employees who shirk will act differently from what they would do if they were self employed. Bosses will therefore have to expend resources to direct and monitor behavior. In our example, the farm hand will have less incentives to exercise effort to get the job done as quickly as possible if he is paid on a time basis. Because of diminishing returns to monitoring, it will not be profitable to eliminate shirking completely, and some residual amount of shirking will remain. "Shirking costs" are the sum of the costs of monitoring performance and that of bearing the residual amount of shirking.

2.4. From Method of Organization to Economic Institutions

The argument so far is that prices and hierarchy are two alternative methods of organizing economic activities. The solutions they provide to the problem of information, bargaining, and enforcement are radically different. While hierarchy centralizes information, the price system decentralizes it. A decentralized information structure avoids the losses due to information transfer, but it experiences problem of suboptimization if prices do not provide the "right" information, i.e information that defines the good in all of its attributes. Hierarchy's solution is to centralize information, but this reduces the incentives that individuals have to collect information and leads to information loss.

The problem of rewarding useful behavior is also solved by the price system in a way that is quite different from that used by hierarchy. The price system motivates individuals to maximize output, but its efficiency is limited by the cost of measuring all dimensions of output: individuals can be expected to underproduce those dimensions of output which use positively priced inputs if measurement is costly, i.e. they will cheat.[5] Hierarchy solves the problem of cheating by decoupling reward from (market-measured) output, but this solution requires control of behavior. Since such control is costly, it will generally not pay to monitor perfectly, and employees will relax their effort (they will shirk).

Because the price system and hierarchy provide different methods of organizing economic activities, they tend to experience, for a given

transaction, different levels of organizing costs. In our previous example, measuring the quality of the output (the evenness in the application of fertilizer) was costlier than specifying and monitoring behavior (how the fertilizer should be and is applied). In that case, employing a worker to spread the fertilizer will be chosen over subcontracting that task. Inversely, the price system will be used when output is relatively easy to measure, but behavior is difficult to direct and monitor. Such would be the case from home workers, who toil in dispersed locations and are therefore costly to supervise.

So far we have described two methods of organization, the price system and hierarchy. What is the relationship between these methods of organization and the economic institutions of firms and markets?

A simple answer is that firms are institutions which use hierarchy, while markets use price signals. In fact, both institutions use a mix of both methods of organization for reasons shown below. However, the example of fertilizer application shows that the essence of firms is the employment relationship, i.e. the imposition of behavior constraints. It is by imposing behavior constraints (and simultaneously relaxing price constraints) that the cost of uneven application of fertilizer is reduced. Hence the use of hierarchy (behavior constraints) is the distinguishing mark of firms. And empirically the use of pure employment contracts, in which the employee is rewarded entirely in function of his obedience to managerial directives, is widespread in firms.

Because the level of shirking may, in some activities, grow more than proportionally as behavior constraints replace price constraints, the firm may reintroduce price constraints alongside behavior constraints within the employment relationship. Consider the sales function: the firm can either use the price system (contract with sales representatives) or use hierarchy (hire employees paid on a time basis). The choice between those two options depends on the comparison of two types of cost: sales reps will maximize effort, but will also fail to supply outputs that are costly to measure, for example customer service (Anderson and Oliver, 1987). When the latter is important, firms will use in-house salespersons. Because their salary is now independent of performance, they are likely to be less energetic in making calls. If the cost of curbing shirking is very high, paying them in part through commissions is often a cheaper method of control than hiring additional supervisors to monitor their behavior (to follow them on their rounds and record how many sales calls they make). Hence a mix of both modes of organization may be, in some instances, the least cost way of effecting coordination. Firms generally use a mix of price and behavior constraints which will vary with the nature of the tasks involved. What defines the firm is a relatively heavy emphasis on behavior constraints; markets, on the other hand, are characterized by the predominant use of price constraints.

3. Control Processes within Firms.

This section describes in more detail the control processes used in firms. The discussion will focus on the relationship between the employer and the employee, first at the task level, then at that of the subunit.

3.1 Control of Employees

In the hierarchical method of organization, the central coordinator (the boss) tells employees what to do and rewards them in function of their following orders. Since employees are paid a fixed amount to obey managerial directives, the information they collect no longer benefits them directly. They therefore can be expected to be less motivated than self-employed individuals to gather and to make use of the information that is relevant to production. This means that a hierarchical system requires that the employer have a good knowledge of the employee production function and be able to voice or draft clear directives to guide his or her behavior. In Ouchi's (1979) terminology, tasks must be "programmable."

The need for the top coordinator to know the employee's production function to be able to direct his behavior can be combined with the relative level of shirking vs. cheating costs to categorize the various types of control mechanisms used in firms. Table 1, adapted from Ouchi (1979), summarizes the argument. Firms can use three types of control, depending on the degree to which management has an information advantage over employees, and on the level of shirking costs relative to cheating costs.

Cells 1 and 2 correspond to behavior control. As argued above, this method of control is useful when all dimensions of performance cannot be easily specified ex ante and measured ex post, so that rewards based on outputs would generate high cheating costs. It may then be cheaper to control behavior. There are, however, two ways of imposing behavior control. The first one is the method described so far, hierarchical control (cell 1). Hierarchical control consists in explicitly telling employees what to do, and

in observing their behavior to ascertain that they are following orders. This control can be exerted personally by the boss, or impersonally through bureaucratic rules and regulations (what Child (1973) has called a "centralizing" and a "bureaucratic" strategy of control). In a fundamental sense, those two modes of control are similar: they aim at specifying behavior, i.e how employees must act. Hierarchical control will therefore be used when two conditions are met: the employer knows well the employee's production function, and the cost of shirking is less than that of cheating. For example, machine-paced processes, such as assembly lines, make monitoring easier, because the productivity of the employee is indicated by his behavior. Using piece rates on assembly lines would be dysfunctional, as workers would fail to cooperate, and would abuse the machinery. At the same time, assembly-line processes make it difficult to separate the productivity of one employee from that of the others. Firms tend therefore to use hierarchical control for such processes.[6] The costs of using hierarchical control are likely to rise dramatically with geographical dispersion, which raises monitoring costs, and with idiosyncratic tasks, because how to perform these tasks cannot be specified ex ante.

In some cases, workers have an information advantage over management, and output is difficult to measure and price in all of its dimensions, a situation characteristic of "professional" work (cell 2). Efficiency requires that employees be left free to make production decisions, yet output is difficult to measure. The solution then consists in having the objectives of the employee coincide with those of the employer. There are two ways to insure that this is the case: (1) select workers who have the same goals as

management; (2) invest resources in persuading worker who may have different goals to internalize the employer's values, i.e to act without external constraint in the employer's best interest (Ouchi, 1981, pp. 414-415).[7] The first strategy makes direction and monitoring unnecessary, since employees will do what is needed out of their own self-interest. An example would be to hire student athletes to do maintenance work (Pratt and Zeckhauser, 1985). Firms can also attempt to persuade employees with divergent goals that "what they want to do is the same as what they have to do" (Kanter, 1972, p. 1; see also Van Maanen, 1975). If the firm is successful, employees will voluntarily choose not to shirk. This method, which Ouchi, following Durkheim (1933), calls "clan", and Baliga and Jeager (1984) call "cultural control", economizes on information and monitoring costs. Socialized employees need not be monitored, and they do not have to be given specific answers to specific problems: they only need to be told the goals or philosophy of the organization. They can deduce from it the rule appropriate for any situation (Ouchi, 1981, p. 421). Hence the system is much more flexible than hierarchical control. Because employees now espouse management's goals, few resources need be invested to measure performance nor to monitor behavior. Rewards can be tied to the dedication of the individual to the group and to his or her length of service, a behavior that facilitates socialization.

These two methods are often combined, and they involve very substantial up-front costs. Compared to hierarchical or price control, more resources must be devoted to selection, to training, to communication, and to social interactions, so as to impart the philosophy of the firm to the new recruits. Socialization strategies are therefore cheaper to implement if the society

from which employees are recruited is already culturally homogenous. Investment in selection and socialization will only pay off if the firm can guarantee that the individual will have a long tenure with the organization. But probably the biggest limit to socialization is that it tends to create an inbred group of managers, intolerant of differences, and unreceptive to outside ideas, a phenomenon known as "groupthink" (Janis, 1972). Creative types do not do well in socialized organizations, as shown, for example, by the difficulties experienced by IBM in developing in-house software (Depke, 1989).

In cells 1 and 2, the control exercised by the employer is behavior control: explicit in the case of hierarchical control, implicit and internalized in the case of socialization. The third type of control (cell 3) is output-based, in the sense that the reward of the agent is a direct function of his output, but not of the way he has achieved it. We call it price control. This mode of control is efficient when the employee's knowledge of his production function is better than that of management's and the performance of the worker is easily measurable in all of its dimensions. In that case, directing the behavior of the employee and rewarding him for following orders would be inefficient, since the worker knows better than the boss how to achieve management's goals. It is better to let him free to behave as he deems appropriate, and to selectively reintroduce a market mechanism to control shirking by establishing a link between rewards and outputs. This form of control takes the form of piece work and commissions.

The benefit of using price controls within firms is that, given positive monitoring costs, they elicit greater effort.[8] They also harness the capabili-

ties and the knowledge of the employee, and make control possible without the need for management to know the production process and to closely monitor employees. Output-based rewards thus save on managerial capabilities. The costs of such system is that, unless all dimensions of performance are measured and priced (or constrained), maximization of effort will also lead to maximization of unwanted side-effects.[9] For example, paying piece rates for "picking" crabs (i.e. for extracting crabmeat from crabs) will incite workers to extract only the back meat, which is easier to take out, and to leave claw-meat in the shells. This tendency can be (and is) easily checked by weighing the picked shells, and comparing their weight to the weight of the crabmeat. The ability to control such behavior makes it possible to use piece rates. On the other hand, application of fertilizers on fields is done on a time-wage basis (i.e hierarchical control), because it is difficult to determine whether or not the chemicals have been uniformly applied, and because the consequences of uneven concentration can be substantial (Roumasset and Uy, 1980).

Note that the relative cost of using each form of control will vary across transactions within a given firm. Employees in some departments of a store may be paid through commissions, while others receive a straight salary.

3.2 Control of Subunits

The same analysis can be used to explain the pattern of control at the level of the firm's subunits (subsidiaries) (Table 2). If the performance of the subsidiary is difficult to measure, and headquarters (HQ) knows better than the subsidiary what has to be done, then it will resort to hierarchical control (cell 1). Decisions will be taken by HQ and the subsidiary will be

told what to do. If HQ goals can be internalized by the management of the subsidiary, then control can be achieved through socialization. Lastly, control can be achieved through prices, by setting up the subsidiary as a profit center. By choosing appropriate internal transfer prices, the firm can elicit the same behavior than it would obtain through behavior control. If output is measurable, and HQ has less knowledge than the subsidiary manager on how to achieve the desired outcome, then letting subunit managers free to maximize the subsidiary's results, and rewarding them in function of those results, will achieve better results than specifically directing their behavior with directives from HQ, as local managers will be incited to make use of their specialized knowledge for the benefit of the firm. Establishing the affiliate as a profit center has also informational advantages, since it relieves HQ from having to learn how to operate locally, and it economizes on the amount of information that has to be sent and received from affiliates. Instead of sending complex directives and numerous memos, HQ sets up transfer prices; instead of collecting numerous measures on the many dimensions of performance, the head office looks at a single figure, the profits achieved by the subsidiary, and rewards its manager accordingly.

The practical problems and limitations involved in setting up such schemes provide a good illustration of the costs and benefits of price controls and show why their use in firms is necessarily limited. To maximize their income, managers will maximize the profits made by their units. In the process, they will maximize the use of underpriced inputs or the generation of underpriced outputs (of those whose price is below the opportunity cost to the firm). For example, if the impact of the subunit's on the firm's reputation is

not priced by HQ, and if subunit mangers are rewarded on the basis of the annual profits made by the unit, then they can be expected to engage in activities that maximize yearly profits at the expense of the firm's reputation. All inputs and outputs used and produced by the profit center (including intangibles such as reputation and experience) must therefore be correctly priced to reflect their cost and benefit to the firm as a whole.

Our model shows that this is an impossible task. If all interactions between the firm's subunits could be priced, then there would be no benefits to intra-firm organization. Activities have been internalized within the firm because market prices failed to organize at least one of the interdependences. Because some inputs and outputs will not be priced correctly, managers will suboptimize. Suboptimization is equivalent to cheating: it means that employees will take advantage of the imperfection of the system used to measure their output.[10] To check the resulting generation of unwanted side effects, and to encourage the production of desirable ones, HQ will add to the transfer prices used to organize priceable interdependencies and hierarchical constraints to organize the unpriceable ones. The subunit manager will be told to maximize profits, but specific directives will be communicated concerning ethical behavior, worker safety, pollution control, employee turnover, etc. This constitutes a reintroduction of hierarchical constraints. There is a limit to how far a firm can go in this direction. As more and more hierarchical constraints are introduced, the advantages of profit centers will be reduced. HQ will now have to send more directives to the subsidiary, and to collect more information on compliance. Subsidiary managers will see their autonomy decline, and their incentive to work hard and show initiative will be

correspondingly lowered. Both the informational simplicity and the motivating virtues of profit centers will be lost. Shirking costs will rise with the increase in behavior constraints.

3.3 Conclusion

We would expect the relationships between HQ and subsidiaries to be a mix of the three control techniques described above, and to vary with HQ's knowledge of the subunit's environment and the degree to which interdependences between the parent and the subsidiary can be measured and constrained through prices. Non-priceable interdependencies organized through price controls will lead to cheating (suboptimization). On the other hand, imposing hierarchical constraints lowers the incentives that subsidiary managers have to show initiative. The optimum control system should balance those two sources of cost, shirking and cheating (suboptimization).

4. Some Observations on the Model

It may be worthwhile, at this stage, to compare the model developed above with agency theory and with the way organization theory approaches the problem. In contrast with some agency models (Eisenhardt, 1985), we do not assume risk aversion on the part of the employee, and consequently do not consider the risk-bearing consequences of control strategies. The model also diverges from agency theory in specifying the cost of control as the sum of the resources spent to impose a particular method of control plus the cost of the unwanted side-effects that result from using this method.

In contrast to organization theory, the model emphasizes the reward aspects of control. This difference in emphasis is particularly important in the case of "price control". The organization literature has generally downplayed price control as defined here[11]. Martinez and Jarillo (1989), for example, review the organizational literature on control and list the eight most common mechanisms of coordination used in firms. Price control, as defined in this study, is not included. The authors mention output control, which they define as "based on the evaluation of files, records, and reports submitted to corporate management" and which they equate to "bureaucratic control" (Child 1973). Output control is lumped with behavior control, and no recognition is made of the fundamental difference between the two.

This is surprising, given the extensive use of price controls in firms. About one-quarter of all workers in U.S. manufacturing industries in the mid-70s (and 23 percent of all farm labor in 1959) were covered by some type of incentive systems (Seiler, 1984). Incentive pay schemes are widespread at upper levels: for example, bonuses made up 31 percent of the total compensation received by executive VPs in 1986 (Reibstein, 1987). Price control is also increasingly considered as a remedy for "bureaucratic failures". The recent trend has been towards a development of these practices, with the establishment of "intrapreneurship" schemes, and the recent move towards commissions in department stores (Dunkin, 1989).

Although "output control" may seem similar to price control, there are important but subtle differences between the two. Egelhoff (1988), in a very thorough study of control mechanisms in MNEs, measures the extent of output control by the frequency with which a number of performance measures (e.g.

sales to specific accounts or inventory levels) are received by HQ. This concept differs significantly from "price controls". Although price controls are output controls, since a price system rewards output, not all output controls are price controls. Price controls establish a clear link between rewards and output. They insure that the agent will not shirk and will use his privileged knowledge to the employer's advantage. They are informationally economical because they save the employer from having to collect extensive information on the employee's production function. Output controls can differ from price controls for two reasons. First, some organizations collect output measures, but they have no direct influence on rewards, and hence on motivations. Second, the term output control is sometimes applied to intermediate outputs. Observing the values of many intermediate outputs comes close to monitoring behavior. For example, when HQ asks a subsidiary manager to report the level of salaries in the sales department, and it intervenes if the overall wage bill is not reduced by 10 percent, this is tantamount to telling him outright to cut the wage bill by 10 percent, which is straight behavior control. The way organization theorists define output controls has led some of them to consider behavior control and output control as complements, while in our model (and in agency models) they are substitutes (Eisenhardt, 1985).[12]

One important limitation of the model developed in this chapter is the lack of a time dimension. The model is implicitly a one period model. No consideration is given to experience rating in firms and in markets. Yet reputation effects can, in some cases, reduce cheating, while career ladders can have a similar impact on shirking.

5. Application to Multinational Firms

The three control techniques that we have described are used in varying proportions by multinational enterprises (MNEs) to control their foreign subsidiaries. Hierarchical control over subsidiaries is exercised through visits from HQ personnel, written and oral directives sent to the subsidiary, and requests for information. Socialization strategies have always played a crucial role in MNEs. When communication costs were high, these strategies were the only way to control far-flung subsidiaries. Family members were sent abroad to manage the foreign business. Later, family members were replaced by a small corps of trusted home-country managers (e.g. the "Dutch Mafia" at Philips), who were then assigned to run the subsidiaries. Increasingly, socialization is used to develop a corps of both home-country and foreign country nationals (Edstrom and Galbraith, 1979). Bartlett and Goshal (1989, ch. 10) document the efforts of some of the MNEs they studied (but especially Unilever) to create such a cadre through extensive training and job rotations.[13] Lastly, MNEs also often set up subsidiaries as profit centers and reward their managers on the basis of the profits of their subunits.

5.1 Cost and Mix of Methods of Control for Foreign Subsidiaries

Extending our model to the MNE raises two main questions. First, how does doing business across countries affect the level of organizing costs? Second, how does it impact the mix of control mechanisms used?

There are reasons to believe that each of these three control modes will be more costly to implement in an international than in a domestic setting. Consequently, the lowest-cost mix of modes used to control foreign affiliates

will be more costly than that used for domestic subunits.

Hierarchical control will be more expensive to implement in the case of foreign than in the case of domestic subsidiaries. Geographical distance makes it more difficult to observe behavior, since travel will be necessary. Second, cultural differences make communication more costly: the need to be explicit is greater, the chances of distortion increase with differences in languages. Third, foreign environments are likely to be substantially different from domestic ones; hence employees positioned in foreign countries have usually a substantial information advantage over HQ, and central direction is more likely to be inefficient. In fact, up until recently, the length of time it took to refer to HQ and receive directives made centralization an extremely costly proposition, and led MNEs to rely heavily on "on the spot" decisions.

Operating internationally also increases the cost of socialization. Doing business abroad requires cross-cultural contact. That contact can take place at various levels. The cultural homogeneity of the management corps can be kept intact by sending expatriates to run the foreign subsidiary. Then the cross-cultural interface is within the subsidiary, between the local labor force and the expatriate manager. Or the local subsidiary may be run by local managers, and then the cultural barrier must be bridged between HQ and subsidiary managers. Using expatriate managers makes it possible to use socialization strategies, but tends to damage relationships with local suppliers, customers, and host country governments. Local employees may also resent expatriates because they are usually paid more and because they limit their advancement. Running the subsidiary with local managers, on the other hand, will automatically raise the costs of socialization, as it dilutes the

homogeneity of the group. In conclusion, imposing explicit or implicit behavior constraints is more costly internationally than domestically.

The costs of using price constraints would seem to be less affected by distance. As argued earlier, prices are very condensed signal, hence the cost of communicating prices is not much greater across countries than within a country. Ouchi's finding (1978) that measures of output are less subject to distortion than measures of behavior when transmitted across hierarchical levels, supports this view.[14]

If we are right in our assumptions about the impact of internationalization on the relative costs of imposing price and behavior constraints, then interactions of a type that would be organized within firms in a domestic context will be handled through the market (or not at all) when they involve agents located in more than one country. As far as I know, there has been no systematic empirical work testing this proposition. There is some evidence, however, that the use of market processes to exploit knowledge (as opposed to its internalization) is much more common internationally than domestically. In their study of licensing contracts, Caves, Crookell, and Killing (1982) noted that licensing was much more frequent internationally than domestically.[15]

A second implication of our analysis is that the mix of techniques used to control foreign subsidiaries should be more biased towards price control than that used for domestic subsidiaries. One testable implication is that a greater proportion of foreign than domestic subunits should be run as profits centers.

5.2 Centralization and Interdependencies

The explicit consideration of the full menu of methods of control used in firms could help explain some of the conflicting results found in the study of organization processes in MNEs. Consider first the study of centralization and of its determinants. Centralization is one of the fundamental dimensions of organization design. It is defined as the extent to which HQ makes decisions, so it is equivalent to what we have called hierarchical control. Organization theorists have argued that the extent of interdependency among the subunits of the organization is an important determinant of centralization (Van de Ven, Delbecq and Koenig, 1976; Tushman and Nadler, 1978). According to Egelhoff (1988, p. 131), interdependencies increase the need for information processing. Centralizing decisions at HQ is one way to tackle this increased information load, as "centralization provides coordination and integration across the interdependency". Hence, Egelhoff hypothesizes that the extent of centralization in MNEs should be correlated with the degree of interdependence between the subsidiary and the rest of the organization.

Egelhoff tests this hypothesis by calculating the degree of centralization of 22 decisions in three areas, marketing, manufacturing, and finance, and correlating them with nine measures of interdependency. As shown in Table 3, the results are mixed. Of the potential 27 correlations, only six are significant at .05 (one-tailed test) and have the right sign.

The present study suggests some explanations for these results. Recall that Egelhoff argues that efficiency requires that all types of

interdependencies be organized through centralization of decision-making at HQ (in our terminology hierarchical control). The model we have sketched suggests, however, that not all interdependencies require coordination through hierarchical control. Exercising behavior control from HQ requires collecting a tremendous amount of information on local conditions and on the extent to which managers of foreign subsidiaries are following orders. If some interdependencies can be mediated through prices, HQ will economize on the need to gather information. All it needs is to specify appropriate transfer prices, and let the subsidiary operate as a profit center. Centralization will be low, even though control may remains high. Only interdependencies which are not easily priced will be organized through direct behavior control. For example, HQ is unlikely to determine operating decisions for the subsidiary (such as how to price its products) unless it purchases these products from the affiliate (there are interdependencies) and there are no market prices to guide the transfers (interdependencies are not priceable). Dependencies that are priceable include intracompany transfers of traded materials and of standard technical knowledge. On the other hand, a subsidiary's use of a parent's trademark or of its guarantee in borrowing funds is difficult to price, and hence the parent will find it desirable to specify the quality control procedures to be followed by the subsidiary and the uses to which borrowed funds must be committed, i.e. HQ will control the behavior of the subsidiary's manager.

Another factor weakens the connection between centralization and interdependencies. As argued above, behavior control can be explicit (hierarchical control) or implicit (socialization). An MNE faced with

interdependencies which cannot be organized by prices need not resort to hierarchical control (centralization): it can instead socialize subsidiary managers into making decisions that are similar to the ones that would be taken by HQ. Hence the link between interdependencies and centralization (hierarchical control) is not as direct as hypothesized by Egelhoff. Price control and socialization can act as substitutes to centralization. This may account for Egelhoff's results.[16]

5.3 Autonomy of Affiliates

The present analysis also throws light on the concept of autonomy of foreign affiliates. Autonomy is generally measured as the locus of decision-making: if decisions are made at HQ, the subsidiary is said to have little autonomy (Hedlund, 1981; Welge, 1987). The concept is clear, but its interpretation is more ambiguous. Decisions made by a perfectly socialized manager may be undistinguishable from those made at HQ. This will also be true for an "autonomous" manager responding to a correctly specified system of transfer prices. Autonomy measures the relative use of hierarchical control (cell 1) as opposed to socialization and price control (cell 2 and 3). But it does not necessarily reflect the subunit manager's degree of responsiveness to local conditions and to the needs of local stakeholders.

5.4 Is Decentralization Desirable?

The explicit consideration of price controls in firms also suggests some new ways of looking at modern management methods. Consider the following parallel between profit centers and piece work schemes. Both have the same goal: to motivate the employee to apply effort and initiative when output is

relatively easy to measure and the employee has an information advantage over management. Yet while decentralizing management to divisions (and to subsidiaries) and rewarding their managers on the basis of their profits (setting up a multidivisional structure) has generally been considered a major advance in management (Chandler, 1966; Williamson, 1975; 1985), the piece rate system has been seen in a very different light. Piece rate schemes have been said to "absolve managers of the responsibility and costs of exploring, designing, and supervising craft labor processes, which are typically complex and arcane" (Brown and Philips, 1986). This was certainly the point of view of Taylor, and the goal of Scientific Management was to replace price controls by behavior controls. This required management to invest in knowing the worker's production function (through time-and-motion studies, and the payoff was a significant increase in productivity (Edwards, 1979). Couldn't then decentralization, especially if it consists in having locals run the MNEs' foreign subsidiaries, be also seen as a way to avoid learning how to operate in foreign countries, as a way to avoid management? If so, the recent decline in the use of expatriates by US MNEs, a decline which seems to be due to the inability of U.S. managers and of their families to adapt to conditions abroad (Kobrin, 1988), bodes ill for the ability and the willingness of American MNEs to compete in increasingly global industries.

Table 1

Employee Control modes used in firms

cheating costs/ shirking costs	Management knowledge of the worker's production function: higher than workers	lower than workers
high cheating low shirking	1. hierarchy	2. selection and/or socialization
low cheating high shirking	4. no interaction within the firm	3. price control (e.g. piece work)

Table 2
Subunit Control modes used in firms

cheating costs/ shirking costs	Headquarter's knowledge of the unit production function: higher than local management	lower than local management
high cheating low shirking	1. hierarchy "centralization"	2. selection and/or socialization
low cheating high shirking	4. no interaction within the firm	3. profit centers

Table 3

Correlations between Centralization Scales and Strategic and Environmental Conditions

Subsidiary-Level Conditions	Centralization in Marketing	Manufacturing	Finance
marketing information dependence	.21*	.24*	.10
new manufacturing information dependency	.01	.14	-.19
day to day manufacturing information dependency	.11	.15	-.06
new product design dependency	-.10	.16	-.25**
product design change dependency	.10	.27**	0
intracompany purchases by subsidiary	.08	.14	-.24*
intracompany sales by subsidiary	.27**	-.01	.24*
sales dependence	.11	.03	.19*
size of subsidiary (sub size/parent size)	.19	-.19	0

Source: Egelhoff, 1988, Table 7-2

Notes

1. If one assumes some degree of competition, one can expect the most efficient mode to dominate the less efficient one, and thus the mode actually chosen to organize the transaction should match that predicted by this theory. The model is thus applicable to those cases where institutions are not sheltered from competition by collusion or government intervention. It has, therefore, greater applicability in competitive industries than in government bureaus.

2. Note that they do it "in complete disregard of the decision of others, or even the existence of others" (Demsetz, 1988). This is because prices reflect perfectly the social consequences of each agent's actions.

3. Indeed, in some firms they may be punished for doing bearing bad news.

4. To simplify the exposition I am abstracting here from reputation effects. With bounded rationality, the probability of losing reputation due to dishonest behavior will never be 1, and can in fact be remarkably low. In some cases, however, reputation effects may be high enough to discourage dishonesty.

5. In our example, they will underuse effort in applying fertilizer because effort reduces their utility.

6. For a fascinating case study, see Brown and Philips (1986).

7. We are considering here strategies if control within the firm. An alternative strategy is, of course, to subcontract the activity (to let it be organized through the price system).

8. Clark (1984) quotes the results of a number of studies comparing the hourly rates of pieceworkers vs. time workers in a number of occupations. Pieceworkers earned between 13 and 25 percent more than time workers. This cannot be due to self-selection, since firms using time rates have the possibility to fire least-efficient workers and to keep the most efficient ones.

9. A typical example of this is the recent case of an IRS employee who received bonuses linked to the percentage of taxpayer's queries answered. He maximized it by systematically throwing out any query left unanswered by evaluation time. In terms of our model, the externalities generated by failing to constrain all aspects of behavior were probably greater than the reduction in shirking due to the use of market processes.

10. Intertemporal suboptimization is also a problem. Subsidiaries are not free-standing entities, and are not generally quoted on local stock markets. There is therefore no easy way to evaluate the impact of the subsidiary manager's present decisions on the subsidiary's future profit stream. If the manager is rewarded on the basis of annual profits, he can be expected to maximize present income at the expense of future profits by a variety of stratagems, such as cutting R&D budgets, or cutting employment and jeopardizing long-term government relations.

11. An exception is the work of Ouchi (1979, 1981). Ouchi pointed out that firms could either monitor the performance of their employees on the basis of behavior or on that of output. His explanation of the choice between these two modes is, however, different from the one used here. For him, "a bureaucratic form of organization succeeds because it replaces complete forms of contracting with a single incomplete contract, which is the employment contract" (Ouchi, 1981, p. 416). He does not make the link between shirking and cheating (see for example 1979, p. 836).

12. Eisenhardt (1985) found commission payments and straight salary to be substitute forms of compensating salesclerks.

13. Sometimes socialization is extended to the whole labor force. For example, Nissan spent $63 million to send 383 employees of its U.S. assembly plant to see its Japanese operations and be indoctrinated in the company "way of doing things"

14. Differences in tax rates between countries may make it advantageous to use transfer prices which differ from arm's length prices. As a result, a subsidiary's reported profits may diverge from its real profits. Rewarding managers on the basis of these reported profits will have strong disincentive effects. One solution is to keep two sets of books, one for the tax authorities, and the other to judge the profitability of the subsidiaries and to reward their managers. The latter record the profits obtained by using unbiased transfer prices (Brooke and Remmers, 1970).

15. See also Taylor and Silberston (1973, ch. 7).

16. Egelhoff finds a significantly positive correlation between output control and centralization, and no significant correlation between the extent to which subsidiaries are staffed with expatriates and both centralization and output control. The first set of results may be explained by the way output control is measured. The second set of findings may come from the difficulty of keeping the desired level of control constant when observing the mix of methods used to control foreign subsidiaries.

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