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2.1 Introduction

Transfer from the public to the private sector (or vice versa) of entitlements to the residual profits from operating an enterprise necessarily implies a change in the relationships between those responsible for the firm's decisions and the beneficiaries of its profit flows. In general, the change in the allocation of property rights leads to a different structure of incentives for management and hence to changes in both managerial behavior and company performance. This chapter therefore analyzes some of these immediate incentive effects of privatization in the context of U.K. market arrangements and political institutions.

The relationships between managements and the proximate or ultimate recipients of residual profit flows can be viewed as giving rise to a particular set of agency problems. The general agency problem can be characterized as a situation in which a principal (or group of principals) seeks to establish incentives for an agent (or group of agents), who takes decisions that affect the principal, to act in ways that contribute maximally to the principal's own objectives. The difficulties in establishing such an incentive structure arise from two factors: (a) the objectives of principals and agents will typically diverge, and (b) the information available to principals and agents will generally be different (for example, the former might not be able to observe some of the decisions of the latter).

Within this framework managements of firms can be regarded as agents acting (in the case of private ownership) for shareholders or (in the case of U.K. public ownership) for the department of government to which they are responsible. Alternatively, in the latter case, government departments may themselves be considered to be agents acting for the ultimate principals, the voting public. Either way, an immediate consequence of privatization will be some shift in the objectives of principals. In addition, it is also to be expected that the transfer of ownership will be associated with some change in the types of incentive systems that can be offered to managements. Thus, under private ownership, rewards can be linked to the company's share price via share ownership or options schemes, while poor financial performance might be penalized by the threat of a takeover by another firm.

The implications of these differences in principal-agent relationships will be considered in sections 2.2 and 2.3 below. Of particular interest are the possible effects of ownership on economic efficiency, and, in examining this issue, it is useful to distinguish between allocative efficiency in the market, which depends upon the output levels of firms with given cost structures, and internal efficiency, which depends upon the total costs to the firms of producing given bundles of outputs.

In public policy debate in Britain, it has often been claimed that the privatization of firms with market power tends to improve internal efficiency, but at the risk of worsening allocative efficiency unless some of the effects of profit-seeking behavior are held in check by sufficiently rigorous competitive and/or regulatory constraints. As will be seen in sections 2.2 and 2.3, this view, while not necessarily incorrect as an empirical summary of final outcomes, rests upon a number of specific assumptions about the incentive structures associated respectively with private and public ownership. Thus, to explore further the nature of the trade-off between allocative and internal efficiency that exists when a firm is transferred from public to private ownership, section 2.4 of the chapter sets out a simple formal model that incorporates changes both in objectives and in the effectiveness of the system for monitoring managerial performance. In this example it turns out that unit costs are lower under private ownership if and only if the private monitoring and incentive system is significantly better than the public system.

Section 2.4 also serves to highlight a very important point in the economics of privatization. Ownership arrangements are only one of a variety of factors that influence managerial incentive structures and economic performance, and, in particular, the competitive structure of the industry in which the firm is operating and the regulatory constraints that it faces will each have significant effects on incentives (and hence on both allocative efficiency and internal efficiency). Moreover, the impact of changes in any one of these three sets of influences (ownership, competition, and regulation) on efficiency will, in general, be contingent upon the other two.

Competitive forces and regulatory policies will be examined in detail in chapters 3 and 4 and, for the moment, it need only be noted that the theoretical analysis indicates that the effects of privatization cannot properly be assessed in isolation from these additional influences on incentives. This conclusion is also supported by empirical studies of the relative performance of public and private industry in the U.K. and elsewhere, some of which are summarized and discussed in section 2.5.

Although somewhat uneven in quality and scope, the empirical literature does at least serve to counter the simplistic view that the effects of ownership on performance are uniform and independent of other economic conditions.

2.2 Private Ownership

2.2.1 Principal-Agent Theory

Economic analysis of the behavior of privately owned firms most frequently rests upon the assumption that the aim of decision makers is the maximization of profit, where the latter is defined to encompass both current and future financial flows. However, while it is likely that privatization will indeed lead managers to place greater weight on profit goals, the changes involved are rather more complex than a straightforward shift to profit maximization. It will therefore be useful first to consider some general features of the underlying principal-agent problem, together with their implications for the behavior of a "typical" company that has been transferred to the private sector.

A general description of the agency problem runs as follows. There exists a principal and an agent—the owner and the manager of a firm, for example—who do not share the same objectives. The principal wants to induce the agent to act in his (the principal's) interests, but he does not have full information about the circumstances and behavior of the agent, and so he has a monitoring problem. This prevents the principal from successfully telling the agent what to do, for he cannot fully observe what is happening. In any event, he would usually want the agent's behavior to depend on circumstances that perhaps only the agent can observe. Principal-agent theory is concerned precisely with this problem of information and incentives. It addresses the central question: what is the optimal incentive scheme for the principal to lay down for the agent?

There are two versions of the basic principal-agent model. Let W and π be the utility functions of the principal and agent respectively, let a be the agent's action (which might be his level of effort), and let θ represent the state of the world. The principal cannot observe a or θ individually, but he can observe the outcome $x(a, \theta)$ of the agent's action given θ , and he makes his own action (e.g. a payment to the agent), denoted y , a function of that observed outcome. Thus the principal's problem is to choose $y(x)$, the *incentive scheme* for the agent. In doing so he must recognize two constraints. First, the agent will behave in a self-interested way given the incentive scheme. Second, the incentive scheme must be attractive enough

for the agent to be willing to participate in the venture with the principal.

The two versions of the basic model differ according to whether the agent can or cannot observe θ at the time when he chooses his action. If he cannot, the agent chooses a to maximize his expected utility given $y(x)$. Much now depends upon the agent's attitude to risk. If he is risk-neutral, the optimum incentive scheme takes a simple form: the principal receives a flat amount from the agent whatever happens. That is, the agent bears all the risk (but being risk-neutral he does not mind that), incentives are "perfect," and there is no monitoring problem. However, if the agent is averse to risk, optimality requires the principal to offer the agent some insurance in bad states of the world. This dulls the agent's incentives, because he gains only part of the benefit resulting from extra effort on his part. The asymmetry of information can therefore give rise to "slack."

In the second version of the model the agent *can* observe θ before deciding on his action. His strategy in the face of incentive scheme $y(x)$ will then be a function $a(\theta)$, since the best action will depend upon circumstances (i.e. on θ). As before, the principal must also ensure that the incentive arrangement is sufficiently attractive for the agent to want to take part in it. (This "participation constraint" can take a variety of forms depending on whether it needs to hold for all θ , on average, or whatever.)

There are numerous applications of principal-agent theory in economics, including relationships between regulators and managers (see section 4.3), employers and workers, lenders and borrowers, landlords and tenants, insurers and the insured, and tax authorities and households. A fuller exposition of the theory and some of its uses is given by Rees (1985), whose bibliography contains detailed references. In what follows, however, we will initially be concerned only with the relationships between the shareholders and managers of a privately owned company.

The decisions in such a company will be taken by professional managers whose payoffs will not exclusively be dependent upon profit flows. At the simplest level, it can be assumed that managerial utility is a function of income and effort levels, although several other relevant variables have been suggested in the literature, including the sales revenue of the firm, its growth rate, and the level of discretionary managerial expenditures. The inclusion of one or more of these additional variables is usually motivated by a desire to capture the implications of managerial preferences for greater power and increased prestige.

The typical large company will have many shareholders, each of whom possesses a relatively small fraction of the total equity of the firm. In addition the shares in the company will be marketable. Hence, at any time,

a shareholder can transfer his property rights to another investor and thereby terminate his direct relationship with the company. As a consequence, substantial changes in the number of principals and in the distribution of shareholdings can occur quite rapidly (see Alchian and Demsetz, 1972).

In these circumstances the pursuit of its own objectives by the management of the firm will be constrained by three groups of participants in capital markets:

- (i) the firm's shareholders, seeking contractual arrangements with management that maximize their own payoffs;
- (ii) other investors or their agents (e.g. managers of other companies), who might purchase the firm's shares as a prelude to attempting to alter existing contractual arrangements;
- (iii) the firm's creditors (including lenders at fixed interest), who could seek managerial changes in the event of threatened or actual default.

The impact of these three groups on managerial incentives will be analyzed under the headings of shareholder monitoring, takeovers, and bankruptcy.

2.2.2 Shareholder Monitoring

Before examining the problems faced by principals in specifying and enforcing managerial contracts, it is necessary first to consider shareholders' objectives. The working assumption that will be made is that shareholders seek to maximize their expected financial return (profit) from the company. One justification for this approach is that, if shareholders hold diversified asset portfolios, it is reasonable to suppose that in respect of their returns from any one individual firm they will be approximately risk-neutral. There are, however, a number of possible objections to the assumption, and since some of them may be significant in the context of the U.K. privatization program they should be noted explicitly.

First, in a world of uncertainty, asymmetric information, differential taxation, and incomplete markets, the interests of different shareholders will not coincide. Even if it were true that each sought to maximize his expected financial return from the firm, in general there would be a lack of unanimity in shareholders' rankings of alternative managerial policies. For example, an institution such as a pension fund might prefer a higher dividend payout ratio than an individual investor faced with a somewhat different tax position. This is, of course, a general problem in the theory of the firm that can only be dealt with at the cost of a substantial increase in the complexity of the analysis (see Ekern and Wilson, 1974).

Second, if shareholders are also consumers of the firm's products, their interests in decisions will not be confined to the effects of managerial actions on financial returns. To illustrate, while a higher price might contribute positively to shareholder welfare through an accompanying increase in company profits, it would have the additional effect of reducing welfare derived from the shareholder's consumption of the final output. The point is particularly relevant where consumers of a monopolist's products hold a substantial fraction of its share capital (e.g. a newly privatized utility company such as British Telecom or British Gas).

Third, for a variety of reasons, many of the shareholders of a company transferred to the private sector may not in fact have diversified asset portfolios. Thus, by encouraging wider share ownership in general, and employee share ownership in particular, the U.K. privatization program has created a large class of small shareholders with interests in only a very limited number of companies. In such circumstances the risk-neutrality assumption may well be inappropriate.

We will return to some of these points later when we come to analyze the detail of privatization policies in Britain. Initially, however, our focus will be on other aspects of the agency problem surrounding privately owned firms, and, for the moment, the assumptions that shareholders are expected-profit maximizers and are unanimous in their rankings of managerial actions will suffice.

Given this assumption, then, the first issue to be considered concerns the implications of dispersed share ownership for the effectiveness of shareholder monitoring of management. If there existed only one, risk-neutral, shareholder, we could hypothesize a benchmark optimal contract between the firm's owner and its management. The terms and conditions of such a contract would depend upon factors such as the relevant production function, managerial preferences, and the information structure of the problem (who knows what and when, and the methods and costs of acquiring more information). At this stage the precise details of the optimal contract are not important; all that needs to be assumed is that there are nonzero specification and enforcement costs. A single owner would bear all these costs but, in return, would receive all the residual profit flow from the firm.

When the ordinary share capital of a firm is divided amongst many investors, the activity of specifying and enforcing managerial contracts confers external benefits on others. If one of the shareholders engages in this task, he bears the full cost of the activity but receives only a fraction of

the total gain. For example, if the increase in expected profit resulting from an incremental increase in monitoring by i , assumed to cost c_i , is equal to $\Delta\pi$, the individual shareholder will only receive a benefit of $\mu_i\Delta\pi$, where μ_i is the fraction of the shares held by i . In such circumstances there is a danger that, from the perspective of shareholders as a whole, the intensity with which managers are monitored will be suboptimally low. If that is the case managers can be said to have discretion to pursue their own objectives and it may not be appropriate to base analysis of company behavior on the expected-profit-maximization assumption.

A second reason why dispersed shareholdings might lead to suboptimal monitoring of managements emerges from possible characteristics of the monitoring technology. As a result of factors such as economies of scale in the acquisition of information, it could be more cost effective to have monitoring activities concentrated in a single pair of hands, thereby avoiding the possible duplication of effort associated with multiple shareholdings. In other words, cost conditions might be such as to make monitoring of management a natural monopoly.

The problems associated with dispersed shareholdings, and in particular their implications for assumptions about the objectives of the firm, have long been recognized in the economics literature. Nevertheless, profit maximization, together with its variants that allow for risky profit flows, has continued to maintain a dominant position in the formal analysis of company behavior. One defense of this standard position rests upon the takeover threat which will be discussed in section 2.2.3. Other arguments include the following.

First, company law establishes a framework in which monitoring activities can be centralized via a board of directors for the firm. Directors are elected by shareholders, and serve as agents for the latter in specifying and enforcing managerial contracts. For example, the directors can establish incentive structures that link managerial remuneration to financial performance through such mechanisms as profit-related bonuses and share option schemes. While this arrangement introduces a further layer of principal-agent relationships (with attendant monitoring problems), it is at least arguable that the existence of nonexecutive directors partially attenuates the discretion of managements.

Second, it is sometimes claimed that, for many firms, the degree of dispersion of shareholdings has been exaggerated. Thus, when the holdings of various members of the same family are consolidated it frequently turns out that, for medium-sized firms at least, there exists a group that accounts for a significant fraction of the share capital. Again the point is not that

external effects in monitoring activities are absent, but rather that such effects are smaller than is sometimes supposed.

Third, to reduce risk, the typical investor will hold a diversified portfolio of shares. For large institutional investors such as pension funds and insurance companies, the holdings may be spread over hundreds of companies and in total may amount to billions of pounds. The principal-agent relationship between a given investor and a given management should not therefore be viewed in isolation from other similar relationships elsewhere. In deciding upon the appropriate level of monitoring activity in respect of one company, the shareholder will take account of any secondary effects that such an activity will have upon the value of his holdings in other firms, since, in conditions of imperfect information, actions will send information signals to other managements that tend to affect the latter's behavior (cf. Kreps and Wilson, 1982). Thus, active monitoring of one management may help to create or maintain a reputation for toughness that in turn serves to restrict the discretion of the managers of other firms in which the investor has an interest. Put more formally, the incremental benefit of an increase in monitoring of one management can be expressed as $\Delta\bar{\pi} + \mu_i\Delta\pi$, where $\Delta\bar{\pi}$ is the increase in expected profit from other companies in the portfolio. Hence, even if μ_i is relatively small, there might still be substantial incremental payoffs from monitoring, and hence the suboptimality implied by the earlier analysis could be relatively small.

Finally, even accepting the existence of managerial discretion at the senior management level, the implications of this phenomenon for profit performance may not be clear cut. The existence of larger rewards at the top of the hierarchy serves as a prize that intensifies internal competition for the acquisition of senior management positions, with associated benefits for company performance. That is, when the managerial function is viewed as a whole, the existence of large prizes at the top may serve as a relatively satisfactory incentive structure for shareholders. Moreover, in conditions of oligopolistic competition it will not generally be optimal for shareholders to have profit-maximizing managers acting as their agents. Thus, if managers derive utility from higher sales or market shares, the existence of discretion arising from dispersed shareholdings will influence the decisions of rivals and will thereby have an indirect effect on the profits of the firm in question. It is therefore possible to envision circumstances in which, via its effects on the behavior of rivals, more dispersed share ownership is associated with *higher* realized profit flows (cf. Vickers, 1985c).

In conclusion, it can be seen that, because the principal-agent

relationships between managements and shareholders exhibit a number of subtleties, it would be premature to conclude that models of company behavior embodying one or other variant of the profit-maximization hypothesis should be abandoned when shareholdings are dispersed. However, uncritical acceptance of the notion that the managers of privately owned firms will *always* be constrained to act in the best interests of their shareholders is an equally unacceptable position. What is indicated is a more case-specific approach to the incentive problem that allows for some quantification of the various factors that are relevant to the principal-agent relationships.

2.2.3 Takeovers

Thus far we have been considering situations in which the management of a newly privatized firm is confronted by a large number of shareholders who seek to introduce incentive structures aimed at maximizing expected profit. Since shares are marketable, however, the size distribution of shareholdings can change quickly as a result of investors' buying and selling decisions. In particular, at any time, one individual or institution can seek to purchase *all* of the shares by making a takeover bid for the company. If successful, the bid would concentrate ownership and eliminate the externalities associated with multiple holdings. It can therefore be argued that, as a consequence of marketability, dispersion of shareholdings is not a factor of great significance for managerial incentives.

Consider, for example, a management that was not maximizing expected profit. A takeover raider could purchase all the shares of the company and then proceed to specify and enforce the optimal contract appropriate to the new single-shareholder situation. Suppose that the shares of the target company can be acquired at a price p , and that the value of each share following the introduction of the optimal contract is p^* . Suppose further that there are n shares in the target company on the market and that the transactions cost of the acquisition is f . Then the capital gain available to a successful raider is equal to $n(p^* - p) - f$ and, assuming that potential acquirors are profit maximizers, a takeover will occur when this expression is positive. Alternatively, the condition for a profitable takeover can be rewritten as $p < p^* - f/n$.

The argument is now straightforward. If the management of a firm fails to act in ways consistent with the optimal contract, the share price of the company will fall and the cost of purchasing shares will decline relative to np^* , the value of the firm contingent upon the existence of the optimal contract. As the deviation between p^* and p increases, the management will

at some point become vulnerable to a takeover raid. The existence of this perceived threat of takeover in turn acts as an incentive mechanism that deters management from the pursuit of policies that are substantially at variance with the interests of its shareholders.

The effectiveness of the takeover mechanism in establishing incentives for good financial performance is a matter of some importance for the analysis of privatization policies. When a firm is transferred from the public sector the introduction of shares creates a market for corporate control, and if this market functions in the way described in the preceding paragraphs it can be argued that, whatever the implications of privatization for allocative efficiency, the transfer of ownership will produce powerful incentives toward internal efficiency. Thus, if the firm's internal efficiency is poor, its share price will be relatively low and management will be vulnerable to a hostile bid. The argument does not, of course, imply that *any* deviation from maximum internal efficiency will be punished in this way: some degree of managerial discretion will exist, if only because the transactions costs of takeovers are finite. If, however, the latter are low, management's performance will be heavily constrained by the threatened loss of control.

Detailed economic research on takeovers has revealed several reasons, some theoretical and some empirical, why the above line of argument might lead to a misleading perspective on the efficiency of the market for corporate control. Following Grossman and Hart (1980), consider first the decision faced by a shareholder who receives an offer to buy from a raider intent on increasing the market value of the target company. Let the value of the offer be p per share and assume that, because shares are widely held, each investor believes that his own sell/hold decision has a trivially small effect on the outcome of the bid. If the offer is expected to succeed, the value of the shares will rise to p^* , and it will be better for the shareholder to decline the offer and free-ride on the performance improvement that it is anticipated the raider will generate. In such circumstances all shareholders will decline the offer and the bid will fail. Hence, in equilibrium (where expected outcomes coincide with actual outcomes), there can be no successful takeovers at an offer price less than p^* . However, transactions costs imply that raids are unprofitable at offer prices greater than or equal to p^* . It follows that there is no equilibrium price at which successful takeovers will occur.

The stark simplicity of the free-rider argument's implications are contradicted by the historical record of takeover activity in the U.K. Between 1964 and 1970, for example, approximately one in three of all

companies quoted on the London Stock Exchange disappeared as a result of acquisition, and a "mistake" theory of takeovers is clearly incapable of providing a satisfactory account of this and similar episodes. There are a number of possible explanations of the discrepancy between theory and evidence, including the following:

- (i) strategic behavior by holders of diversified portfolios who accept offers in order to establish reputations as willing sellers and thereby put greater pressure on the managements of other companies in their portfolios;
- (ii) the lack of protection afforded to minority shareholders under U.K. company law, which leaves them vulnerable to oppression by the controlling interest (e.g. via profit transfers out of the target company) in the event that they do not sell and the bid succeeds;
- (iii) the compulsory acquisition provisions of U.K. company law—once an acquiror has obtained acceptances in respect of 90 percent of the ordinary share capital the remaining 10 percent (or less) can be compulsorily purchased at the offer price accepted by the majority—which can be used by the raider to eliminate the payoffs from free-riding strategies.

The first of these points is another version of the reputation argument outlined in section 2.2.2 above. The second has been developed by Grossman and Hart, who treat the post-raid level of oppression of minority interests as a control variable that can be set *ex ante* by the shareholders of the target company. Suppose, for example, that an acquiring company can transfer an amount $\gamma (> 0)$ per share from minority shareholders to itself. If a raid is expected to succeed, the maximum post-acquisition value of a share to a minority holder then becomes $p^* - \gamma$. Thus, if \bar{p} is the value of each share if the raid fails, selling is the optimal decision (irrespective of expectations of success and failure) if the offer price satisfies the two "acceptance" conditions: $p > p^* - \gamma$ and $p > \bar{p}$. However, the "profitability" condition for a successful bid is, as before, $p < p^* - f/n$. The three acceptance and profitability conditions can therefore simultaneously be satisfied, and hence equilibrium takeover bids can occur, if $\gamma > f/n$ and $p < p^* - f/n$. That is, provided the per-share level of oppression exceeds f/n , the effectiveness of the takeover constraint on the behavior of incumbent managements is restored.

There are considerable obstacles, however, to the precise specification of the level of oppression of minority interests, and there is little evidence that the instrument has been widely used by individual groups of shareholders as a mechanism of managerial control in Britain. Rather, protection of minority interests has been determined by the general provisions of

company law and the regulations of bodies such as the City of London Panel on Takeovers and Mergers. In practice, U.K. company law offers only extremely limited protection for minority holders, and, although this eliminates the payoffs from free-riding strategies, it does so at the risk of creating incentives for socially excessive rates of takeover activity: partial takeovers become attractive as a result of the prospective returns from oppression of minority interests, and, if a bid is expected to succeed, there is the possibility that shares could be acquired at a price *below* the pre-bid market level because of the threat of partial expropriation. The provisions of company law have therefore been buttressed by regulations set out in the City Code on Takeovers and Mergers, several of which are designed to protect shareholders against these two outcomes (see Yarrow, 1985). However, as its name implies, the City Code is a form of self-regulation and the associated Takeover Panel has only limited powers of control. Hence, the question of whether or not the existing regulatory framework does in fact provide a level of shareholder protection commensurate with effective functioning of the takeover mechanism continues to be vigorously debated.

The compulsory acquisition provisions of section 209 of the Companies Act 1948 represent a more direct policy response to free-rider problems associated with takeover bids. If an offer is contingent upon acceptances in respect of at least 90 percent of the shares of the target company, the incentives to hold shares in the hope of participating in post-acquisition performance improvements are removed, since, if the acceptance level is attained, the successful raider has a right to purchase all the remaining shares. The vast majority of mergers and acquisitions in Britain are, in fact, characterized by offers that are contingent upon a 90 percent acceptance rate (see Franks and Harris, 1986a).

The compulsory acquisition solution to the free-rider problem is not entirely straightforward, however. Unless accompanied by a sufficiently damaging threat of oppression, the cost of declining an initial offer, even if it is expected eventually to succeed, may be relatively small. Then, if shareholders anticipate that, if the bid is not initially successful, an improved offer will be made (possibly as a result of competition from a second bidder), incentives to hold shares may be restored. Nevertheless, we believe that, taken as a whole, the British regulatory and legal framework does successfully overcome many of the adverse consequences of free-rider strategies, and therefore permits the threat of takeover to act as a potentially important constraint on managerial behavior. Although the solution is not perfect, and many residual problems remain, any major deficiencies in the market for corporate control are more likely to be the

result of other influences that are at work in the market, to some of which we now turn.

Thus far it has been assumed that the objective of the acquiring firm is expected-profit maximization and that takeovers are triggered by deviations in the target management's behavior from that implied by its optimal incentive contract. Both assumptions are open to question. In the first place, raids may be motivated by a desire to increase managerial utility rather than to increase shareholder welfare. Thus, takeovers should be viewed as a potential *instrument of managerial-utility maximization* as well as a *control on* such behavior. Given this point, it is by no means clear that high levels of takeover activity will always be in the interests of shareholders. Second, even if raiders *are* profit seekers, takeovers may be motivated by factors such as the gains from increased market power or from reductions in tax liabilities. King (1986), for example, has argued that British merger activity has historically been correlated with stock market prices as a result of a tax-induced distortion in the pricing of financial assets. The implications of these factors are that even an efficient management may be vulnerable to takeover bids and, more generally, that the link between internal efficiency and the takeover threat may be weakened.

One consequence of this last point is illustrated by the following model of the incentive effects of takeover threats. Suppose that managerial utility is given by $U(x)$, where $U_x < 0$, $U_{xx} < 0$, and x can be interpreted as either the level of managerial effort or a measure of the internal inefficiency of the firm. Let x^* be the effort level associated with the optimal contract. Without loss of generality, $U(x^*)$ can be set equal to zero, and for simplicity we assume this also to be the utility of management in the event that the firm becomes a takeover victim. It is further assumed that the market value of the firm is an increasing function of effort, and that higher effort therefore reduces the perceived probability of takeover. In particular, suppose that the probability of takeover in the period $(t, t + dt)$, conditional upon the firm having survived until time t , is equal to $h(x; \theta) dt$, where $h_x < 0$ and θ is some parameter affecting the relationship between effort and the likelihood of takeover. (In reliability theory, the function $h(\cdot)$ is called the hazard rate.)

In these circumstances the discounted present value of expected managerial utility is given by

$$\int_0^{\infty} U(x) \exp[-(r + h)t] dt = \frac{U(x)}{r + h(x; \theta)} \quad (2.1)$$

where r is the discount rate. Maximizing this expression with respect to x yields the first-order condition

$$\frac{U_x}{U} = -\frac{h_x}{r+h} \quad (2.2)$$

The equilibrium level of effort is therefore determined by the condition that the marginal proportionate increase in utility consequent upon a reduction in effort is equal to the present value of the marginal increase in the probability of takeover, where the latter is calculated at a discount rate equal to $r+h$. Thus, as can be seen more directly from (2.1), one effect of the takeover threat is to increase the discount rate that managers apply to future utility (from r to $r+h$). Determination of the equilibrium effort level, denoted \bar{x} , is illustrated graphically in figure 2.1.

Consider next the effect of a change in the parameter θ which leads to an increase in the conditional probability of takeover at effort level x (θ can be interpreted as reflecting conditions in the market for corporate control). As can be seen from figure 2.1, the implications of the change for the equilibrium effort level depend upon whether the function $h_x/(r+h)$ is shifted upwards (effort decreases) or downwards (effort increases). In general the effect is ambiguous, depending upon the relative magnitudes of two counteracting forces. First, the increase in the conditional probability of takeover raises the denominator in the expression on the right-hand side of (2.2), leading, other things being equal, to an upward shift of the function. Intuitively, managerial discount rates are raised, producing

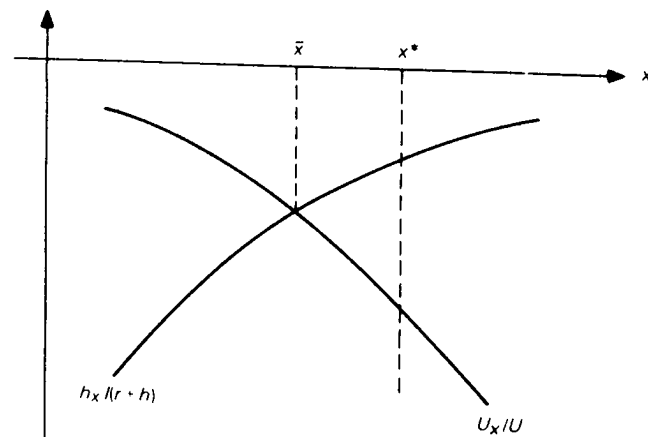


Figure 2.1 Takeover threats and managerial effort

greater incentives for shirking while the incumbent management is still in control of the firm ("making hay while the sun shines"). Second, greater takeover activity can be expected to increase the sensitivity of the probability of takeover to changes in effort or internal efficiency. That is, the absolute value of the derivative h_x can be expected to increase. Other things being equal, this shifts the function $h_x/(r+h)$ downwards, leading to greater effort being applied. In this case the intuition is that increased shirking is punished more heavily by a greater increase in the probability of takeover.

The model therefore demonstrates the possibility that a more active market in corporate control may be associated with lower internal efficiency. The effectiveness of the takeover threat depends upon the strength of the link between managerial effort and the probability of takeover. However, since raids may be motivated by factors other than the potential capital gains resulting from the correction of poor managerial performance, the creation of freely transferable property rights associated with privatization does not have uniformly benign implications for internal efficiency. One potentially adverse effect is an increase in managerial discount rates. In the model above this feeds through into an incentive to reduce effort levels, but it is easy to see how an increased emphasis on shorter-term payoffs could also have adverse implications for other decision variables (e.g. investment) in more elaborate analyses.

It can also be noted that, since acquisition of other firms may be one of the favored methods of increasing managerial welfare, an increase in the threat of takeover could produce a positive feedback effect by encouraging potential target companies to become raiders themselves, thus exacerbating the control problem. This is one example of a more general class of problem connected with the incentives for incumbent managements to engage in defensive actions to counteract the takeover threat, which actions may themselves have undesirable effects on shareholders' interests. Particularly in countries such as the U.K., where shareholders have very little direct influence on acquisition decisions, an unconstrained market in corporate control could easily generate an excessive level of takeover activity.

We conclude, therefore, that theoretical analysis of takeovers indicates a number of possible limitations to the effectiveness of this form of capital market constraint on the performance of managements. That is not to say, however, that takeover threats have no role to play in promoting internal efficiency. Indeed, in general we believe that raiders can, and often do, perform a useful function in this regard, particularly where they have better information about the performance of incumbent managements than the

latter's own shareholders (see Scharfstein, 1986). The point is simply that the impact of the takeover threat depends heavily upon the precise characteristics of the relevant capital market, including factors such as the extent of shareholder protection afforded by the regulatory and legal frameworks, the constraints imposed by competition law, and the relevant fiscal system. Since these vary from country to country, we should not be surprised to find that the role played by the takeover constraint also shows marked international variations. Given our concern with privatization in Britain, it will therefore be useful to examine briefly some of the available U.K. evidence on the effectiveness of the market for corporate control.

The most extensive empirical work on U.K. acquisitions has been conducted by Singh (1971, 1975) who has sought, among other things, to estimate the empirical relationship between company performance and the likelihood of takeover (which relationship is the cornerstone of the argument that takeovers generate incentives for managers to act in the interests of owners). Singh found only small differences in profitability and other measures of financial performance between companies that became takeover victims and companies that did not, casting doubt on the notion that relatively poor performance leads to a sharp increase in the threat of takeover. In contrast, the data did suggest that the likelihood of takeover diminished significantly for firms above a certain size, suggesting that the most effective defense against unwanted bids is for potential targets themselves to seek rapid growth by means of acquisitions. Although later experience indicates that very large companies have now become more vulnerable to unsolicited takeover bids than in the periods studied by Singh, it remains true that the sizes of newly privatized firms such as British Telecom and British Gas provide incumbent managements with substantial protection against takeover threats. In these cases, therefore, there must be considerable doubt as to the efficacy of the takeover constraint on managerial performance.

Meeks (1977) examined the other side of the capital market discipline argument: if raids are motivated by the capital gains that can be realized from improving the performance of an inefficient company, it is to be expected that the financial performance of successful acquirors will itself improve following the takeover. In his sample, however, he could find no evidence of general post-raid increases in the profitability of acquirors, and, if anything, there was a slight, though not statistically significant, deterioration in profitability relative to industry averages.

Unfortunately, the findings of Singh and Meeks cannot be regarded as decisive evidence against the hypothesis that the probability of takeover is

strongly linked to company financial performance. Suppose, for example, that such a relationship exists, but that the management of each firm chooses to act in a way that leads to a probability of takeover that is constant across firms. In equilibrium there would then be no observed differences in the average profitabilities of firms that were and were not takeover victims in a given period. Moreover, competition among potential acquirors might ensure that, where takeover bargains were accidentally available, the gains were appropriated by the targets' shareholders. That is, competition in the market for corporate control might drive the returns from acquisition down to approximately normal levels, implying that no significant net gains could be expected to accrue to successful raiders.

The results of later studies by Firth (1979, 1980) are less ambiguous. Firth found that, although on average the combined market values of acquirors and acquirees in his sample were not materially affected by the takeovers, the average share prices of acquirors fell significantly upon the announcement of the bid while the share prices of acquirees increased substantially. In other words, on average the takeovers led to supernormal losses for the acquirors' shareholders, in line with the hypothesis that takeovers tend to be used as an instrument for improving managerial welfare. Although these results are quite consistent with the view that managers are also constrained by a link between performance and the threat of takeover, taken in conjunction with the theoretical model outlined above they do illustrate the point that shareholder interests may not always be well served by a highly active market for corporate control.

Firth's results have recently been challenged by Franks and Harris (1986a, 1986b) who, using a larger sample and a longer sample period, concluded that acquisitions *did* increase the aggregate market value of the companies involved, and that on average there was no evidence of supernormal losses to acquirors' shareholders. The Franks and Harris results are in line with those of the majority of U.S. studies of the issue (e.g. Halpern, 1973; Mandelker, 1974; Asquith, 1983), although it should be noted that there are dissenting voices (e.g. Malatesta, 1983). Since a large fraction of U.K. takeovers have been of a broadly horizontal nature, to the extent that they do actually exist, such gains may, of course, simply reflect increases in market power rather than improvements in internal efficiency. Where researchers have specifically tried to uncover efficiency improvements attributable to takeovers, the results have not been very encouraging for the capital market incentives argument. Thus, Cowling *et al.* (1980) found no evidence for the proposition that mergers had led to significant improvements in the internal efficiencies of the companies in

their sample, while Newbould (1970) concluded that both *ex ante* appraisals of acquisitions and *ex post* plans to realize potential efficiency gains were, in a high proportion of the cases he studied, extremely limited in scope.

To summarize, although theoretical analysis and empirical evidence do not yield unambiguous conclusions about the strength of the managerial incentives generated by the existence of a market for corporate control, they do indicate certain imperfections in the market that may limit the impact of capital market disciplines on internal efficiency. One problem is the relative lack of shareholder influence on acquisition decisions, over which managers continue to have considerable discretion. Acquisitions therefore appear frequently to have been used to promote managerial interests at the expense of shareholders, and the consequent high level of takeover activity may, by raising managerial discount rates, have had negative consequences for both internal and allocative efficiency. Another potential limitation, which is of some importance for the policy evaluations contained in chapters 8 through 11, is that the takeover constraint may be relatively weak in cases where the target firm is very large.

2.2.4 Bankruptcy

Bankruptcy can be viewed as another means by which managers may lose control of the company, and can therefore be regarded as leading to an alternative version of the takeover constraint. In discussing the implications of bankruptcy, however, the analysis of the previous section has to be modified to take account of a number of special features of control loss that occurs via this mechanism, including (a) the circumstances in which bankruptcy is likely to occur, (b) the fact that proceedings may be initiated by a different group of economic agents (creditors, for example), and (c) the legal and regulatory framework governing the process.

At the simplest level, bankruptcy can be assumed to occur when the market value of the firm's assets falls below the value of its outstanding liabilities. It therefore sets a floor value for the market capitalization of the firm. If it is assumed that managerial utility is a decreasing function of effort, that there is no uncertainty, and that bankruptcy is the only operative constraint, utility-maximizing managers would choose an effort level such that the total market value of the firm is exactly equal to the value of its debt. In these circumstances, while the value of the firm might be increased by raising its debt level, shareholders would derive no benefits from the change: the value of equity would always be zero.

Once uncertainty is introduced, however, it is easy to see how the threat

of bankruptcy affords some protection to ordinary shareholders. To illustrate, let the market value of a firm with debt level D be $\pi(x) + \theta$, where θ is now a random variable with zero mean. The probability of bankruptcy is then the probability that $\pi + \theta < D$, which can be rewritten as $\theta < D - \pi$. It is therefore equal to $F(D - \pi)$, where $F(\cdot)$ is the cumulative distribution function of θ and $F'(\cdot) > 0$.

If $F(\cdot)$ is reinterpreted as a hazard rate, a straightforward adaptation of the model in section 2.2.3 leads to the assumption that managers will seek to maximize

$$\int_0^x U(x) \exp\{-[r + F(\cdot)]t\} dt = \frac{U(x)}{r + F(\cdot)}$$

where managerial utility in the event of bankruptcy has again been normalized to zero. The first-order condition for the optimal effort level is

$$\frac{U_x}{U} = - \frac{F' \pi_x}{r + F(\cdot)} \quad (2.3)$$

If θ^m is the maximum value of θ , the market value of the ordinary shares of the company will be positive provided that the solution of equation (2.3) is such that $0 < \pi(x) + \theta^m - D$ since there will then be states of nature in which the total value of the firm exceeds D and in which shareholders will therefore receive positive returns.

Condition (2.3) is similar in form to equation (2.2) in section 2.2.3. The numerator of the expression on the right-hand side of (2.3) is the marginal reduction in the probability of bankruptcy resulting from increased effort, while the denominator is the effective managerial discount rate. As before, it can be seen that a finite probability of bankruptcy raises this discount rate and that, in general, the overall impact of an increase in the probability of bankruptcy on the effort level is ambiguous in sign.

It can be expected that the tightness of the bankruptcy constraint will largely be dependent upon the difference between the maximum expected value of the firm, denoted π^* , and the firm's debt level. The impact of the constraint on managerial decisions is likely to be greater where market conditions are such as to reduce the value of this spread. Thus, when the relevant industry is experiencing a period of recession or of more intense product market competition, the role of the bankruptcy threat as a control mechanism is likely to be enhanced. However, in boom conditions its role, relative to the other constraints on managerial behavior, will tend to be more limited.

If shareholders are able to control the level of debt of the firm they will be able to use this instrument to influence managerial behavior by varying the

incentive structure that faces the management. This can be seen by noting that, since the level of debt is a parameter of the managerial-utility maximization problem set out above, the equilibrium effort level will be a function of D , denoted $x(D)$. Hence, via changes in D , shareholders can, in principle, influence the internal efficiency of the firm.

There are at least two limitations, however, on the strength of the incentives that can be established in this way. The first emerges as a consequence of the effects of increased debt on the managerial discount rate. Thus, particularly when probabilities of bankruptcy are relatively high, increasing debt may have a relatively greater impact on the denominator of the right-hand side of (2.3) than on the numerator, in which case the effort level becomes a *decreasing* function of D . In effect, if managers believe that the firm has a good chance of going out of business whatever decisions they take, this will lead them to the conclusion that they should enjoy more managerial discretion in the short run. If this occurs, on the criterion of promoting internal efficiency there will usually be a finite optimum debt-to-equity ratio. At this point the usefulness of the bankruptcy constraint as a control mechanism will have been exploited to the fullest possible extent, and further improvements in efficiency will not be feasible via reliance on this mechanism alone.

The second limitation of the bankruptcy constraint is that, in practice, determination of the firm's level of debt is a decision that is most frequently delegated to managements. Hence, managers can ease the constraint, and thereby simultaneously weaken the incentives for internal efficiency and increase their own utility, by choosing lower debt levels than shareholders would wish to see. It is, of course, true that managers will have regard to the consequent negative effects on the market value of the firm's equity. The extent of the concern with valuation effects, however, will be governed by the constraints on managers arising from the threats of shareholder intervention or takeover. Hence, in very many circumstances it is the latter that will be the effective control mechanisms. Only when market values are low as a result of factors such as depressed demand or intense product market competition is it likely that the threat of bankruptcy will play a substantial role. Thus, for example, it is unlikely that this particular control mechanism will have much effect on the incentives for internal efficiency in privately owned monopoly utilities.

2.3 Public Ownership

For publicly owned firms the task of monitoring managerial performance

is entrusted to government. Compared with private ownership, the most obvious differences in the relationships between managers and their immediate principals arise from the facts that (a) the principals do not typically seek to maximize profits, (b) there are no marketable ordinary shares in the firm, and hence no *market* for corporate control, and (c) there is no direct equivalent to the bankruptcy constraint on financial performance.

Even more than in the case of private ownership, the precise detail of the principal-agent relationships surrounding public industry is heavily influenced by the institutional structures of the relevant economy. Since chapter 5 will be devoted to an examination of the nature and record of public ownership in Britain, the discussion in the current section will be restricted to the broader economic issues and problems associated with the specification of objectives and with the framework of control.

2.3.1 Public Interest Theories

Public interest theories are based upon the assumption that, in their dealings with industry, government departments seek to maximize economic welfare. The rationale for this approach is that such bodies are themselves agents for, and therefore properly should act in the best interests of, the wider public. Put another way, public interest theories abstract from the incentive problems associated with this agency problem by implicitly assuming that a first-best solution to it can be attained. We will return to this issue in section 2.3.2.

The usual approach is to assume that the objectives of government departments are defined by some form of social welfare function—thereby also begging questions connected with the aggregation of individual preferences—and the most frequently adopted specification is that social welfare is equal to the sum of consumers' and producers' surpluses, denoted S and π respectively. In other words, it is assumed that government departments seek to maximize a partial equilibrium measure of economic efficiency. There are, however, two "public interest" reasons why, in practice, governments might want to attach differential weights to consumers' and producers' surpluses in their objectives.

The first arises from *distributional* objectives. In the case of a privately owned firm, if shareholders are typically more wealthy than the average taxpayer a government concerned with redistribution might wish to reduce transfer payments from taxpayers to shareholders. Moreover, irrespective of the type of ownership, low income households often account for a substantial fraction of the sales of some utility industries (because income

elasticities of demand for the goods are low), in which case the government might attach extra weight to consumer interests for distributional reasons. In addition to these possible "egalitarian" motives for distributional objectives, a government concerned only with domestic welfare would discount the proportion of a (wholly or partially) privately owned firm's profits accruing to overseas shareholders (a factor that is relevant in the telecommunications and gas privatizations discussed in chapters 8 and 9).

A second reason why a government would not be indifferent to transfer payments to the firm arises from the costs of raising public funds. For example, the payment of a subsidy to the firm requires raising tax revenue from elsewhere in the economy or extra government borrowing or money creation. But higher taxes will add to the distortion of economic decisions in other markets (for example, higher income tax would affect the trade-off between work and leisure). Similarly, borrowing or money creation would cause costs to be incurred elsewhere. In short, the payment of an additional £1 subsidy to the firm would impose upon the rest of the economy a cost that is in excess of £1.

The simplest way to incorporate distributional considerations is to write the government's objective as $W = S + \alpha\pi$, where $0 < \alpha < 1$. The cost of public funds can be represented by stating the objective as $W = S + \alpha\pi - \lambda T$, where $\lambda > 0$, T is the transfer paid to the firm, and λT captures the cost of the extra distortions created elsewhere in the economy. Although these versions of a government's objective function have the virtue of simplicity, it must be remembered that they are very crude when viewed in the light of the complex general equilibrium effects that should ideally be taken into account. The shortcomings of the partial equilibrium approach are well known, but it does at least provide a useful starting point from which the analysis can proceed.

Given a welfare-maximizing government, and assuming for the moment that monitoring of management is equally effective under both types of ownership, it is immediately obvious that public ownership has some potential advantages over the private alternative. In particular, it provides government with additional policy instruments to correct any deviations between social and private returns that arise from failures in goods and factor markets. To give just one example, profit-maximizing monopolists may engage in a variety of business practices that run counter to the public interest, and, while it may be feasible to limit such behavior via the provisions of competition or regulatory policies, the complexities of this type of exercise in conditions of asymmetric information may render public ownership the preferred framework in which to tackle the problems.

The market failure argument can also be applied to the market for corporate control: government monitoring does not encounter the public good problems associated with dispersed shareholdings and avoids the transactions costs of share purchases that are incurred by takeover raiders seeking to gain control of a firm. In contrast with a shareholder who owns only a small fraction of the outstanding shares, government departments can directly intervene in managerial decision making or can set appropriate incentive structures for the managers of publicly owned firms. Thus, for example, government can, *in principle*, provide profit-related bonuses and/or fire personnel when performance is poor.

The loss of some instruments of control (e.g. takeover and bankruptcy threats) that results from public ownership does not necessarily imply, therefore, that monitoring is thereby made less effective. For privately owned firms, Williamson (1975) has argued that hierarchical arrangements can, in appropriate circumstances, produce more efficient monitoring than capital markets. Indeed, it is difficult to understand why firms of any size should exist at all if hierarchical solutions to the control problem were not more efficient than market solutions in a wide range of economic conditions.

Determination of the balance of advantage between hierarchical and market control systems, however, is a complex exercise. One of the major aspects of performance monitoring is the acquisition of relevant information about the firm. Under public ownership this information-gathering role is effectively entrusted to a single body, whereas private ownership typically involves the participation of many individuals and institutions that are frequently specialists in the given task. While there may be scale economies in the acquisition of information, it is also likely that competition among independent monitors will lead to the discovery of a greater volume of relevant information. The possibility remains, therefore, that, even from the idealized perspective of public interest theories of governmental policy, private monitoring may provide the more effective method of control.

2.3.2 Government Incentives

The assumption that the public interest can be represented by a well-defined function which governments seek to maximize is clearly rather heroic. In one sense it can be regarded as the obvious counterpart of the assumption that privately owned firms are profit maximizers, since the latter is based upon the notions that shareholders' interests are well defined and that managers act in the best interests of their shareholders.

Nevertheless, just as in the case of private ownership, an examination of the relevant principal-agent relationships is required to assess whether or not the assumption is likely to provide a sound basis for analysis of the behavior of publicly owned enterprises.

The position is complicated by the fact that two distinct groups of public officials are involved in monitoring activities: politicians and civil servants. The full monitoring hierarchy is therefore made up of the general public, its elected political representatives, nonelected civil servants, and the managers of the publicly owned firms. Hence, it is necessary to analyze a number of separate principal-agent problems.

Consider first the relationships between the general public and its elected representatives. As in the case of managers, it is unlikely that preferences of politicians can accurately be captured by a simple and general objective function. The variables upon which utility might be assumed to depend are numerous and include factors such as monetary rewards, effort levels, and power. One feature of the problem does stand out, however, and that is the relative insecurity of tenure enjoyed by politicians: the period spent by one individual as head of a department responsible for the control of a particular public enterprise is frequently rather brief, and may be ended by electoral failure or by promotion or demotion. Since the politicians of a given party have a common interest in electoral success, it is likely that promotion and demotion within the period of office of a given administration will in turn depend heavily upon the individual's contribution to the electoral prospects of his own party. If it is assumed (a) that the utility of politicians is much higher in office than out of office and (b) that the effects on utility of changes in other variables are substantially smaller in magnitude, this suggests that a useful starting point for the analysis of political behavior is the hypothesis that decisions are taken with a view to maximizing the probability of electoral success.

Given this hypothesis, it might still be maintained that, with respect to the behavior of publicly owned firms, politicians will seek to achieve economic efficiency. For, if resources were not allocated in an efficient manner, there would be scope for improving the welfare of some sections of the public without making others worse off, which should have a positive, or at least nonnegative, effect on the electoral prospects of the political party in power.

The argument does depend, however, upon voters being well informed about both the decisions made on their behalf and the eventual consequences of those decisions, and in practice there will be very

considerable informational asymmetries between politicians and voters. Consider, for example, the position of a typical member of the public. He or she will have an opportunity to vote once every four or five years and will face an almost zero probability of influencing the outcome of the election. Further, the election will be concerned with a wide range of issues, not just with the question of the stewardship of any one publicly owned firm. In these circumstances, the average voter has very little incentive to acquire costly information about the performance of elected representatives in monitoring particular firms.

Furthermore, the benefits and costs of political decisions are often not evenly spread throughout the population. Those groups that are substantially affected by monitoring activities (the workers in a publicly owned firm, for example) will therefore have greater incentives to acquire information than the average voter, with the result that informational asymmetries between different groups of voters will also emerge.

The latter asymmetries imply that politicians responsible for the monitoring of public industries may no longer derive electoral benefits from improvements in economic efficiency. To illustrate, suppose that improvements in the internal efficiency of an enterprise are possible but that, in the absence of compensatory transfer payments, they would lead to a fall in the welfare of workers in the industry. Political action to encourage managers to reduce unit costs would be observed by workers who suffer materially as a consequence, but the benefits from lower taxes and/or lower prices, if widely spread throughout the population, might not be visible to the recipients. On the other hand, if workers in the industry were compensated for their losses, this would draw the attention of taxpayers to the magnitude of the benefits from efficiency improvements that they (the taxpayers) would be required to forego so that workers can continue to enjoy the fruits of the earlier inefficiency. Thus, whether or not compensation is actually paid, informational asymmetries indicate that an efficiency improvement could sometimes lead to a worsening of electoral prospects. In a similar vein, there could be electoral benefits in setting politically sensitive prices (e.g. domestic telephone rates, electricity and gas prices) at levels below marginal cost, since the direct positive impact on consumers is more visible than the indirect negative effects arising from the accompanying changes in fiscal policy.

To summarize, in addition to suggesting that consumers' and producers' surpluses will be accorded differential weights in government objectives, the asymmetric information arguments imply that payoffs to workers in publicly owned firms will also be a factor that affects the utility of elected

officials. Thus, an appropriate specification of the *political* objective function might be

$$GW = S + \alpha\pi - \beta x - \lambda T$$

where x is some measure of the effort applied to cost reduction in the industry. The negative weight attached to x in this equation captures the electoral payoffs from easing the pressures on the wage rates and effort levels of workers in the industry.

In the context of public ownership in Britain there is one further point about the role of politicians in the monitoring hierarchy that is worth making at this stage. Until recently, the option of linking managerial rewards to performance in relation to underlying political objectives has been eschewed. This may have been due in part to the difficulties of measuring some of the components of the underlying objective function (consumers' surplus and workers' rents, for example) but also probably reflects an unwillingness explicitly to reveal those objectives. Whatever the cause, the result has been that control of public enterprises has frequently involved political intervention in the detail of the managerial decision process itself, rather than the "arm's length" relationship between departments and managers that was envisioned when many of the enterprises were first nationalized (see chapter 5). The consequent confusion of roles is therefore an additional source of potential inefficiencies in the control of nationalized industries.

Turning to the civil servants who, in support of their ministers, undertake much of the detailed monitoring work, it can be expected that insecurity of tenure will play a less central role in explaining behavior than in the case of elected politicians. The two most commonly cited variables that are likely to affect utility in this case are the size of the relevant government department or subdepartment and the rents accruing to the officials (see Niskanen, 1971). Thus, if y is a variable measuring the output of the department, z is the actual unit cost level (assumed to be a decision variable), and c^* is the efficient unit cost level, the utility of officials might be assumed to be given by a function $U[y, (z - c^*)y]$ which has positive first-partial derivatives. An economic model of bureaucratic behavior could then be constructed by assuming that this function is maximized subject to a fixed budget constraint of the form $yz = B$.

Suppose, for example, that $U(\cdot) = y^2(z - c^*)$. In that case it can easily be shown that equilibrium activity and unit cost levels will be equal to $B/2c^*$ and $2c^*$ respectively. The activity of the department is therefore an increasing linear function of the budget, while unit costs are always equal to

twice their optimal level. Substituting back into the utility function we find that maximized utility is equal to $B/4c^*$, so that, as is to be expected in general, the payoffs to officials are an increasing function of their departmental budget. (Some models of bureaucratic behavior, which are more concerned with the process of budget determination than with output efficiency choices, simply assume that officials aim to maximize an indirect utility function $U(B)$.)

The activities of civil servants are, of course, monitored by the politicians who are in charge of their departments. As the above example shows, however, if the size of budget is the only instrument of control, the resulting outcomes may be far from satisfactory: unit costs in the model are twice their optimal levels. More direct monitoring of bureaucratic activity will therefore be required if effective performance is to be achieved, but there are a number of reasons for believing that the results will not be entirely satisfactory. First, there is the problem of asymmetric information between civil servants and departmental ministers which, in countries such as the U.K., is exacerbated by the relatively brief periods of tenure of particular ministerial offices by given politicians. Lacking good information about departmental performance, and in particular lacking suitable benchmarks against which such performance can be evaluated, ministers may find it extremely difficult to improve efficiency. Second, the incentives for ministers to search for performance improvements are generally fairly weak since the resulting payoffs are unlikely to have much of an impact on electoral prospects. Third, the factors that increase the welfare of civil servants are likely, other things being equal, to have positive effects on ministerial welfare: ministers can also be assumed to favor increases in the size of their departments and to derive some benefits from higher rents to the civil servants who surround them. Indeed, U.K. departmental ministers are frequently notorious for the tenacity with which they seek to increase or defend their own budgets.

Although it can be expected that a given level of bureaucratic activity will be conducted at greater than minimum unit cost, it is not clear whether the level of activity itself is likely to be suboptimally high or low in relation to either political or social objectives. The key factor is the size of the budget: whichever of the two objectives is used as the benchmark, the higher the budget expenditure the more likely it is that the departmental activity level will be excessive, as can be seen from figure 2.2.

In the diagram, the line MB shows the marginal benefit of departmental activity, and it is assumed that the budget is set at a level where the total benefit of the activity is equal to its total budgetary cost (i.e. that

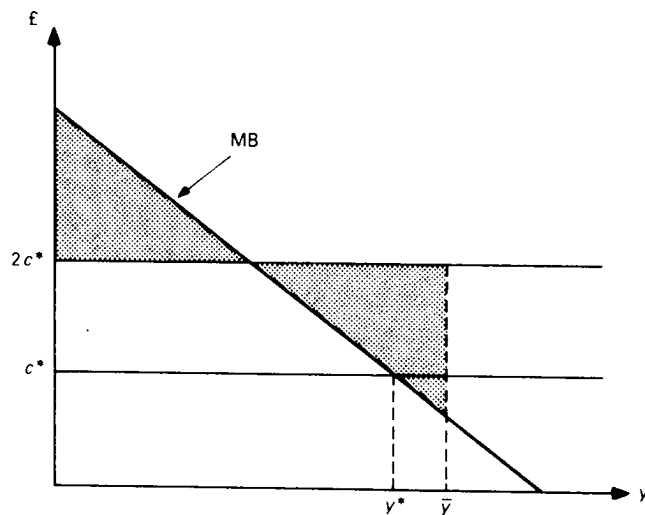


Figure 2.2 Determination of bureaucratic activity level

bureaucratic activity absorbs all the potential surplus that is available). The equilibrium activity level is therefore \bar{y} , which is determined by the condition that the two shaded triangles are equal in area. The optimal activity level, given by the condition that marginal benefits are equal to (efficient) marginal costs, is y^* , which is less than \bar{y} . Equilibrium output \bar{y} , however, is directly proportional to the size of the budget so that, if the latter were reduced, it could easily turn out to be the case that bureaucratic activity is suboptimally low ($\bar{y} < y^*$).

To conclude, judged in terms of public interest criteria, we have identified four potential sources of suboptimality in the framework of control for publicly owned industries: displacement of social objectives by political objectives; a preference for direct political intervention in managerial decisions over an "arm's length" relationship that would restrict government departments to the task of setting appropriate managerial incentive structures; internal inefficiencies in bureaucracies; and inefficient levels of bureaucratic activity. The implications of these factors for the performance of publicly owned firms will vary with the precise institutional details of differing frameworks of control, and we will have more to say on this issue in chapter 5. However, as a matter of general principle, it can safely be concluded that incentive structures for public enterprises will tend to exhibit significant imperfections at each level of the monitoring hierarchy and, in particular, that public interest theories of

political decisions are unlikely to provide an adequate conceptual basis for the analysis of behavior in nationalized sectors of the economy.

2.4* Ownership and Economic Efficiency: A Benchmark Model

As noted in the introduction to this chapter, it is possible to argue that the privatization of a firm that enjoys substantial market power will tend to improve internal efficiency, but at the risk of worsening allocative efficiency unless profit-seeking behavior is held in check by an appropriate framework of competition and regulation. The purpose of this section, therefore, is to examine this possible trade-off between internal and allocative efficiency in the context of a very simple model in which a monopoly firm is privatized. The assumptions underlying the analysis are intended to capture (albeit in a highly stylized way) a number of the features of private and public ownership that have been discussed in sections 2.2 and 2.3. A more extensive treatment of the issue has been provided in a recent paper by Bös and Peters (1986).

Consider therefore the situation of a private monopolist supplying a homogeneous good, and suppose that, by virtue of the principal-agent problems outlined in section 2.2, managerial incentives to engage in cost-reducing activity are imperfect. That is to say, the manager is rewarded only partially for the benefit that the owners receive from cost reduction. To reflect this assumption it is postulated that the manager maximizes

$$\begin{aligned} A(q,x) &= \pi(q,x) - (a-1)x \\ &= [p - c(x)]q - ax, \end{aligned}$$

where q is the output level, x is expenditure on cost-reducing activities, p is price, $c(x)$ is unit cost, and a measures the cost of effort to the private manager relative to the benefit to him of greater profit. If $a = 1$ he would have the "right" incentives for effort (i.e. he would be a profit maximizer), but in general we shall assume imperfect incentives, in which case $a > 1$.

Under public ownership the manager of the firm is assumed to maximize

$$\begin{aligned} B(q,x) &= S(q,x) + \pi(q,x) - (b-1)x \\ &= V(q) - cq - bx, \end{aligned}$$

where $V(q)$ is consumer utility from output q . For simplicity, in this specification consumers' surplus and producers' surplus have been assumed to have equal weights in the political objective function, and the resource costs of any transfers to or from the firm have been assumed to be zero. The parameter b measures the cost of effort to the public manager

relative to the benefit to him of greater social welfare ($= S + \pi$). Imperfections in the public monitoring system, including any weight given to the rents of workers in political objective functions, are reflected in the assumption that $b > 1$ (workers' rents can be taken to be negatively related to managerial effort). If public and private monitoring systems were equally effective, we would have $a = b$, but if incentives are keener under private ownership, as many would contend, then we have $a < b$.

In summary, the effects of privatization in this simplified setting are to change the (ultimate) principal's objective from welfare maximization to profit maximization and to alter monitoring and incentive arrangements (as represented by the change from b to a in the managerial objective function). The resulting trade-off is clear. Public managers choose the socially optimal level of output for a given cost level, whereas private managers do not, since they seek monopoly profits. Thus allocative efficiency under public ownership is better than that under (unregulated) private ownership. However, if $a < b$, then, for given output, private managers achieve greater internal efficiency than public managers. The overall balance of advantage will therefore depend upon the relative magnitudes of these two effects.

In what follows we denote outcomes under private ownership by a circumflex and those under public ownership by an asterisk. When public monitoring arrangements are no less efficient than private mechanisms we have the following result:

$$\begin{aligned} \text{if } a \geq b, \text{ then } & q^* > \hat{q} \\ & p^* < \hat{p} \\ & x^* > \hat{x} \\ & c^* < \hat{c} \\ & W^* > \hat{W}. \end{aligned} \quad (2.4)$$

That is, public ownership is superior in terms of both internal and allocative efficiency. The (straightforward) proof of the proposition is omitted, but the intuition is as follows. Public managers produce more output and set a lower price than private managers with similar cost levels because they set price equal to marginal cost rather than marginal revenue equal to marginal cost. Since they produce more, public managers also have a greater incentive to reduce costs because the resulting savings are enjoyed across a larger volume of output. Therefore public managers both produce more and make more cost-reducing effort, and social welfare is unambiguously higher.

It follows from considerations of continuity that public ownership is also

superior when $a < b$ in a neighborhood of b . Hence, a necessary condition for the superiority of private ownership is that a should be distinctly less than b . In other words, private incentive systems must be significantly better.

Matters can be taken a little further by postulating isoelastic functional forms for $p(q)$ and $c(x)$:

$$p = \sigma q^{-\varepsilon}, \quad \sigma, \varepsilon > 0;$$

$$c = \beta x^{-\alpha}, \quad \beta, \alpha > 0.$$

Thus, ε is the inverse elasticity of demand and α is the elasticity of unit cost with respect to the relevant expenditures. Under the given demand conditions $V(q)$, which is the integral of the inverse demand curve from 0 to q , is $\sigma q^{1-\varepsilon}/(1-\varepsilon)$, and is therefore equal to the revenue of the firm multiplied by $1/(1-\varepsilon)$. We require $1 > \varepsilon$ for this to be well defined, in which case the effect of the change in objectives is equivalent to a proportionate outward shift in the firm's demand curve.

The resulting maximization problems are now fairly straightforward. For example, in the private ownership case the first-order conditions yield

$$\sigma(1-\varepsilon)\hat{q}^{-\varepsilon} - \beta\hat{x}^{-\alpha} = 0$$

$$\alpha\beta\hat{x}^{-\alpha-1} - a = 0.$$

For the publicly owned firm, the output term in the first equation becomes $\sigma q^{-\varepsilon}$ and b replaces a in the second equation; otherwise the expressions are similar. It can be shown that the second-order conditions are satisfied in both cases if, as we will assume, $\varepsilon > \alpha/(1+\alpha)$.

Solving the two models and comparing the equilibria, we find that

$$\hat{q} \geq q^* \text{ according as } (1-\varepsilon)(1+\alpha)^{-\alpha} \geq a/b. \quad (2.5)$$

This shows how outputs (and hence prices) under the two regimes depend upon the demand elasticity and the sensitivity of cost to effort, as well as the relative effectiveness of the monitoring schemes. As demand becomes more elastic (i.e. ε becomes smaller), the monopoly mark-up of the private firm is reduced, quantity increases, and price becomes lower. This enhances the incentive for cost reduction, and it may be the case that costs are reduced so much that, even with the monopoly mark-up, the price is lower under private ownership. Condition (2.5) also brings out the importance of α , which measures the scope for cost reduction. If α is small enough, public ownership certainly implies lower prices.

With respect to the comparison between cost-reducing activities we have that

$$\hat{x} \geq x^* \text{ according as } (1 - \varepsilon)^{1/\varepsilon} \geq a/b. \quad (2.6)$$

Again, the elasticity of demand is found to be of central importance. For any a and b , if the elasticity is sufficiently low (ε close to 1), then $x^* > \hat{x}$ and costs are lower under public ownership. The limit of $(1 - \varepsilon)^{1/\varepsilon}$ as ε approaches zero is $1/e = 0.3679$, and therefore a must be *much* smaller than b for it to be true that $\hat{x} > x^*$, no matter how elastic demand may be.

Conditions (2.5) and (2.6), together with the assumptions that $a < b$ and $\varepsilon > \alpha(1 + \alpha)$, imply that

$$\hat{q} \geq q^* \text{ implies } \hat{x} > x^*.$$

This is entirely natural. If the private firm produces more than the public firm, then it achieves more cost reduction because the private incentive system is keener. Conversely, if $x^* > \hat{x}$, then $q^* > \hat{q}$: if the public producer has lower costs, then it produces more than the private firm.

A detailed comparison of aggregate welfare under public and private ownership involves messy expressions, but some relatively simple results can be derived from the above propositions. For example, if $a/b \geq (1 - \varepsilon)^{1/\varepsilon}$, condition (2.6) implies that $x^* > \hat{x}$. Hence, $q^* > \hat{q}$, and it follows that $W^* > \hat{W}$. Thus, $a/b \geq (1 - \varepsilon)^{1/\varepsilon}$ is a sufficient condition for social welfare to be higher under public ownership. By similar reasoning it can also be shown that $a/b \leq (1 - \varepsilon)^{1/\varepsilon}$ is a sufficient condition for social welfare to be higher under private ownership.

The cases involving intermediate values of a/b lead to much more cumbersome expressions, but the above analysis of sufficient conditions at least indicates some of the principal features of the problem, and in particular the importance of α and ε , the fundamental parameters of technology and demand. Thus, for example, if ε is interpreted as a measure of the degree of competition faced by the firm and if α is interpreted as a measure of the rate of technical progress in the industry, the analysis tends to support the notion that the merits of privatization are greater in technologically progressive industries where competition is effective. However, given both the static nature of the analysis and the assumption of only one firm, it would be wrong to stretch the interpretations too far.

It should also be stressed that only unregulated private enterprise has been considered. The incorporation of regulation would introduce a new policy instrument into the model, involving a further trade-off between internal and allocative efficiency (see chapter 4), and can generally be expected to lead to results that are more favorable to private ownership than are those derived above. Nevertheless, the possibility of regulation is

unlikely to affect the central implication of the analysis, which is that privatization is likely to improve social welfare only if it provides significantly keener managerial incentives than does the control system for public enterprise.

2.5 Performance under Public and Private Ownership: The Evidence

Given that the relative performance of publicly and privately owned firms in respect of allocative and internal efficiency will depend upon a range of factors that includes the effectiveness of the respective monitoring systems, the degree of competition in the market, regulatory policy, and the technological progressiveness of the industry, evaluation of the welfare implications of privatization necessarily depends upon empirical assessment of the role and significance of each of these various factors. Much of the second part of the book will be devoted to this task for cases that have arisen in the context of the U.K. privatization program. At this stage, however, it will be useful to take a preliminary look at the findings of the more general literature that has been concerned with empirical comparisons of the performance of public and private firms.

Unfortunately, despite the large number of studies that have been conducted, the results of this empirical literature are less informative than might be anticipated. In the first place, many studies focus almost exclusively upon the ownership variable and fail to take proper account of the effects on performance of differences in market structure, regulation, and other relevant economic factors. In part, this is simply a consequence of data problems: the limited number of observations available renders it difficult to conduct complex multifactor analyses. It is also attributable, however, to theoretical failures: even where sufficient data are available, statistical tests have rarely been sophisticated enough to take account of the interacting (nonseparable) effects of ownership, competition, and regulation on incentive structures, and hence on the performance of firms.

Second, in measuring performance there has been a tendency in the empirical literature towards reliance upon variables that are easily observable. Thus, rather than attempting to estimate the sum of producers' and consumers' surpluses, the more usual approach is to examine factors such as profitability, factor productivity, and unit cost levels. As a consequence, in some studies the methodology leads to a bias in favor of private ownership. Given some degree of market power, it might be expected that private firms will tend to be the more profitable, but this in itself has no direct bearing on the question of economic efficiency.

Similarly, a finding that private firms have lower unit costs than their public counterparts does not necessarily imply that their contributions to social welfare are greater; questions relating to allocative efficiency and to the quality of goods or services provided also need to be taken into account.

In the light of this second set of comments it is perhaps surprising that, in surveying the empirical literature up to around 1980, Millward (1982) concluded that there appeared to be no general ground for believing that managerial (i.e. internal) efficiency was lower in public firms. However, a closer examination of the material on which Millward based his article, taken in conjunction with the results of later work, suggests a slightly different conclusion, namely, that privately owned firms tend, on average, to be the more internally efficient when competition in product markets is effective. Thus, subject to the latter condition about competition and provided that other allocative inefficiencies associated with market failures are not substantial, we would argue that the available evidence supports a presumption in favor of private enterprise. However, when market power is significant, and particularly when company behavior is subject to detailed regulation, there is little empirical justification for a general presumption in favor of either type of ownership, and case-by-case evaluation of the various trade-offs is therefore in order.

Investigation of the relative performance of public and private enterprises has been most active in the United States, where the two types of ownership frequently coexist in similar market conditions. The industries that have been most extensively covered include electricity generation and distribution, water, and refuse collection; see Millward (1982), Yarrow (1986), and Boardman and Vining (1987) for bibliographies. With respect to electricity supply, a number of economists (Meyer, 1975; Pescatrice and Trapani, 1980; Fare *et al.*, 1985) have concluded that, after allowing for differences in output mixes and input prices, public sector utilities typically have lower unit costs than privately owned utilities. However, the results are not entirely convincing. As in Europe, public electric utilities have access to cheap capital and, given the capital intensity of the industry, their relative unit costs are highly sensitive to the adjustments made to allow for this factor. Thus, one recent study (Edison Electric Institute, 1985) has argued that earlier papers failed to make adequate allowances for the lower input prices facing public utilities and that, once the appropriate corrections are made, the evidence indicates that ownership has little effect on internal efficiency. Nevertheless, it can safely be concluded that the evidence does not establish the clear-cut superiority of private ownership in respect of cost efficiency.

Analysis of the pricing behavior of public and private electric utilities in the United States also serves as a warning against the presumption that allocative efficiency is necessarily improved by public ownership. Both Peltzman (1971) and De Alessi (1977) found that time-of-day pricing (which, in electricity supply, can be expected to lead to higher allocative efficiency) was more common in private utilities. Tariff structures, however, are heavily influenced by the regulatory environment, and there is evidence suggesting that this is the more important determining factor: jurisdictions in which the quality of regulation is generally regarded as high have been pioneers in the introduction of time-of-day pricing. Moreover, the publicly owned electricity industries in both Britain and France were early proponents of sophisticated peak-load pricing structures.

Work on the U.S. water industry suggests similar conclusions. For example, Crain and Zardkoohi (1978) found that, although regulated private water utilities exhibited over-capitalization (see section 4.2.1), their higher labor productivity implied that, on balance, their unit costs were lower than in public utilities. In contrast, a later paper by Bruggink (1982) found in favor of public enterprise on unit cost criteria. Taken in conjunction with the research on U.S. electric utilities, we are therefore led to the conclusion that, where firms face little product market competition and are extensively regulated, there is no generally decisive evidence in favor of one or other type of ownership.

Research on refuse collection in the United States highlights a different point. Here the findings are much more supportive of the proposition that private firms exhibit greater internal efficiency (see Kitchen, 1976; Savas, 1977; Stevens, 1978), but the more important factor in determining performance may be competition rather than the type of ownership *per se*. The incidence of private firms will tend to be correlated with the existence of competitive tendering for contracts, and the effects of the latter may incorrectly be ascribed to the ownership variable. Thus Savas (1977) found that the gap between the unit cost levels of public and private firms was closed by competitive tendering arrangements.

This last result is not altogether surprising. Competition acts as a selection mechanism that weeds out the less efficient firms: enterprises that survive are those that have passed the selection test and, provided that the competition between the different types of enterprises is fair (which is, of course, a major proviso), substantial differences in the internal efficiencies of the survivors are not to be expected. Confirming evidence of the importance of competition can be found in the study by Caves and Christensen (1980) of the relative performance of the two Canadian

railroad companies, one privately owned and the other publicly owned. On the basis of their findings, Caves and Christensen argue that "public ownership is not inherently less efficient than private ownership," and that the "oft noted inefficiency of government enterprises stems from the isolation from *effective* competition rather than public ownership *per se*." It should be stressed, however, that in this context effective competition presupposes equitable treatment of publicly and privately owned enterprises and that in practice this condition will not always be satisfied. Thus, the tendency of governments to subsidize public firms may account for the rather different findings of Boardman and Vining (1987), who conclude that private companies exhibit significantly better performance in competitive environments.

It would also be wrong to interpret the results of Savas and of Caves and Christensen as implying that, even when markets are effectively competitive in the full sense, there is absolutely *no* link between internal efficiency performance and the type of ownership of the firm (i.e. that ownership does not matter). Supposing, for example, that private firms generally *are* the more efficient, it is to be expected that this will show up in the frequency with which they win contracts. That is, although the unit costs of surviving public firms may, on average, be as low as the costs of their private rivals, we would expect to see far fewer of them in competitive markets. Since this is exactly what we do observe, the evidence, although not conclusive, is at least consistent with a general presumption in favor of private ownership in these conditions. Moreover, in practice, it is often difficult to envision the practical development of greater competition in product markets, and of more effective franchise bidding systems, without allowing actual or potential entry of private firms. Ownership and competition may conceptually be distinct, but that is not to say that changes in the pattern of ownership have no implications for competitive behavior. Thus, in industries where public ownership predominates and where one of the goals of public policy is to promote greater competition (see chapter 3), the available evidence offers some support for certain types of privatization policies.

Evaluation of the relative performance of private and public firms in the U.K. has been much less systematic than in the United States. The existence of state monopolies in utility industries such as electricity, gas, telecommunications, and water has meant that there are no immediate domestic benchmarks against which the performance of the public enterprises can be assessed. As a consequence, most empirical work has focused upon more competitive market structures where the two types of ownership have coexisted.

A good example of this type of study is the paper by Pryke (1982), which compares economic performance in three industries: airlines, ferries and hovercraft, and the sale of gas and electricity appliances. Pryke analyzed a range of productivity, profitability, and output variables, and concluded that, in each case, the private firms tended both to be more profitable and to exhibit greater internal efficiency than their public sector rivals. These findings have been reinforced by later work on airlines (Forsyth *et al.*, 1986) and ferries (Bruce, 1986). Similarly, Rowley and Yarrow (1981) found a slight deterioration in the productivity performance of the British steel industry following nationalization in 1966, coupled with more significant declines in market share and in the rate of diffusion of new steelmaking processes. With respect to refuse collection, a U.K. study by Hartley and Huby (1985) supports the earlier conclusions of U.S. research: the introduction of competitive tendering appears to have promoted reductions in unit costs.

However, each of the U.K. papers is open to objections of one form or another. For example, in the Pryke studies it is not clear that like is always compared with like: in respect of the sales of electricity and gas appliances, the public firms are compared with the more efficient of the private companies operating in the market, thereby biasing the results against the former. In the steel industry paper, the sample period ended in 1975, before the dramatic improvements in productivity that occurred (under public ownership) from the late 1970s onwards (see section 5.7.3). Finally, an Audit Commission study (1984) of refuse collection costs discovered wide variations in public sector performance, with the better public enterprises exhibiting lower unit costs than many of the private firms in the sample.

Nevertheless, U.K. research does provide additional backing for our earlier conclusion that, where competition is effective, the available evidence suggests that private enterprise is generally to be preferred on both internal efficiency grounds and, subject to the qualification that other substantive market failures are absent, social welfare grounds. To repeat, this does not mean that, in competitive markets, we believe that public enterprise is always and everywhere the less efficient type of ownership. Relatively efficient public enterprises can and do survive, but, on average, we would expect the frequency of this occurrence to be lower than for private enterprises.

2.6 Concluding Remarks

In this chapter we have examined some of the implications of different types of ownership for managerial incentive structures and enterprise

performance. Broadly speaking, it can be concluded that "ownership matters" in the sense that changes in the structure of property rights are likely to have significant effects upon firm behavior. At this level of abstraction, however, it is hard to be very precise about the detailed implications of changes in the ownership of a firm, since the latter depend upon factors such as the relevant institutional environment, including the framework of regulation for firms with market power, and the market structures of the industries in which the firms operate. The main message, therefore, is simply that managerial incentive structures are determined via a complex set of interactions among factors that include the type of ownership, the degree of product market competition, and the effectiveness of regulation.

Given the incentive problems associated with the control of publicly owned firms, it is likely that public monitoring systems are generally less effective than their private counterparts. It has been shown, however, that this in itself does not imply that, judged against social welfare criteria, the performance of public industry will be inferior, since allowance also has to be made for the effects of the shift in the objective functions of principals. Where product markets are competitive, it is more likely that the benefits of private monitoring systems (e.g. improved internal efficiency) will exceed any accompanying detriments (e.g. worsened allocative efficiency), a view that is generally confirmed by empirical studies of the comparative performance of public and private firms. In the absence of vigorous product market competition, however, the balance of advantage is less clear cut and much will depend upon the effectiveness of regulatory policy.