

PUBLIC OWNERSHIP: CONCEPTS AND APPLICATIONS

Colin Mayer

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Centre for Economic Policy Research
6 Duke of York Street
London SW1Y 6LA

Tel: 01 930 2963

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ABSTRACT

Public ownership is viewed as a restriction on the portfolio of equities held by investors. Three conditions are required to justify such restrictions. First, monitoring and coordination create concentration in supply or demand. Second, complete contracts must be infeasible or undesirable. Third, the creation of property rights may give rise to undesirable outcomes if demand in subsequent periods is uncertain. Using a multiperiod analysis, public ownership may be justified in circumstances in which considerations of flexibility outweigh those of commitment. The paper applies these ideas to an international analysis of ownership in several industries and finds that they are informative about both observed patterns and factors that are prompting change.

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Colin Mayer
City University Business School
Frobisher Crescent
Barbican Centre
London
EC2Y 8HB

Tel: 01 920 0111

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NON-TECHNICAL SUMMARY

The trend towards privatizing state-owned enterprises has become worldwide. Privatization is being actively discussed or promoted in Austria, France, Italy, Japan, Spain and many other countries. In the United Kingdom, we have come to expect periods of nationalization to be followed by denationalization as political fashions alter, but even by UK standards the size and scope of recent transfers from public to private ownership have been unusual. Why is public ownership everywhere in retreat? It is easy to present a list of the arguments advanced by governments, but policy seems largely to reflect fashions that embrace state and private ownership in turn. We lack a coherent economic theory of ownership to guide policy-makers in choosing the appropriate degree of public involvement in a particular industry.

Privatization and nationalization are descriptions of just one feature of corporate organization: the pattern of equity holdings in an industry. Public ownership in effect imposes an equal distribution of equity holdings across the whole population: it may be viewed therefore as a restriction on the portfolio holdings of individual investors. Leaving aside the problems created by the incorrect pricing of asset sales, a privatization relaxes this restriction, and reallocates equity holdings from an equal to a market-determined distribution.

In justifying state control, we are therefore looking for reasons why individual equity investments should be restricted. As usual when trying to determine whether market processes should be corrected or constrained, we are searching for possible externalities. This paper suggests one important class of externalities arising from differences between the interests of investors and consumers. The paper also argues that this conflict and its implications for public ownership can best be considered within an intertemporal framework, through the application of a general class of models concerned with the resolution of the conflict between choice and commitment. This

topic has been discussed in several other contexts and is being actively pursued as part of a CEPR research project on corporate finance and investment in five countries.

The approach adopted in this paper suggests that three conditions are required to justify public ownership. First, there must be concentration on either the supply or the demand side of the market. The paper discusses the externalities that may arise in savings decisions of individuals and argues that there are circumstances in which the imposition of intermediaries between investor and firm may be warranted. If, for example, investors find it costly to evaluate individual firms then the imposition of such an intermediary may be desirable. The intermediary corrects the externality associated with investors' incentives to free-ride on the evaluation of firms' performance: through monitoring and holding a diversified portfolio the intermediary eliminates the investors' need to evaluate individual firm performance. Similar externalities arise in consumption decisions and they may lead to the introduction of an agency between consumers and producers. Externalities arise, for example, in consumer networks such as communication and computer systems, where the value of services provided to a particular individual depends on the consumption decisions of others. In certain circumstances, coordination of consumption by a central agency may therefore be desirable. An agency may also be required to undertake analyses of heterogeneous products whose quality cannot be readily identified by consumers, such as health care or financial services. The same free-rider problem that afflicts monitoring by investors undermines consumers' quality assessments.

Such intermediaries and agencies provide the basis for concentration in supply or demand, which creates the potential for abuses of power. Although concentration is a product of monitoring and coordination, these alone do not justify public ownership. It is only when the analysis is extended beyond a

single period that ownership becomes an issue. In a multiperiod context, intermediaries can abuse their monopoly positions to the detriment of the consumer or an agency can use its monopoly position to the detriment of investors. These potential abuses may make allocations of ownership and control relevant considerations, but not if such abuses can be stemmed by the creation of appropriate contracts. The second condition necessary to justify public ownership is that complete contracts should be infeasible or costly.

Suppose, for example, that an agency exists on the consumption side of the market. Consider first the case in which savers are committed to the portfolio allocations that they make in the first period. In the second period, consumption decisions are coordinated by the agency, which can choose its supply from a range of producers, each of which has capital in place that is dedicated to production in this sector. This imbalance in flexibility between producer and consumer permits the consumer agency, by threatening to take its purchases elsewhere, to prevent producers earning normal returns on the value of first-period savings. Since in the second period capital invested has no value in alternative employment, the agency can drive producers' returns to zero. If this is anticipated in the first period then there will be underinvestment. While the interests of consumers are furthered by the maintenance of flexibility in production and distribution, restrictions on flexibility are required to promote investment. The relative merits of private and public ownership can therefore be seen as a resolution of this conflict between consumer and investor.

The appropriate allocation of property rights should therefore reflect the relative importance of flexibility and commitment. The greater the benefit to be derived from flexibility in coordination of second-period consumption, the greater the value placed on consumer control. In cases in which there are externalities in consumption and there is uncertainty surrounding

(iv)

second-period preferences, the avoidance of commitment to particular distributions may be of substantial value. On the other hand, the greater the effects of choice of first-period investments on second-period performance, the stronger is the case for retaining investor control and limiting second-period flexibility. In this case, commitment is required to elicit appropriate investment decisions.

Private ownership provides the property rights required to encourage participation in first-period investments. Public ownership, on the other hand, maintains greater flexibility in responding to second-period demand requirements of consumers. Social ownership is thus of proper concern in circumstances in which the property rights of private ownership do not adequately reflect subsequent demand requirements of consumers. Conversely, public ownership does not create the incentives for first-period investment. The third condition for public ownership is therefore that considerations of flexibility should outweigh those of commitment. This conflict between commitment and flexibility is just an application of the concept of time consistency to the question of public ownership.

The paper applies these ideas to patterns of ownership that are observed in several industries in different countries. The theory should be able to explain a number of stylized observations about ownership: (i) public ownership is consistently higher in some industries than others; (ii) in certain industries there are considerable variations in ownership patterns across countries; (iii) with some notable exceptions, proportions of domestic production that are state-owned are broadly similar in several countries; and (iv) privatization is particularly actively pursued in certain industries.

The theory suggests that public ownership is most prevalent in industries in which technical innovation is slow, investment expenditures are modest, and demand requirements are

unpredictable. This is consistent with observed patterns; for example, postal services and railways display the highest degree of state control across countries of any of the industries examined. Moreover, ownership patterns are unlikely to be stable over time: periods of technical innovation will be most closely associated with private ownership. The relevance of public ownership will therefore change over time, even within industries, as technical progress waxes and wanes. The relevance of public ownership will also be at least in part related to the size of economies and the development of their capital markets. The paper suggests that observed patterns of ownership across countries and across industries can in large part be explained in terms of the trade-off between the benefits of flexibility and of commitment.

The paper ends on a note of caution. The association of private property with commitment and public ownership with flexibility may be undermined by imperfections in capital markets and by the organization of government. In particular, once a separation between ownership and control is introduced, then the same problems of commitment that are a feature of public ownership may occur in private companies. Competition in financial markets may discourage investors from making long-term credible commitments. Conversely, the stability of bureaucracies and their procedures for evaluating and rewarding performance may permit governments to make credible commitments of investment to an industry. State-controlled organizations might then be able to implement investment projects that private capital markets could not.



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Abstract

Public ownership is viewed as a restriction on the portfolio equity holdings of investors. Three conditions are required to justify such restrictions. First, monitoring and coordination create concentration in supply or demand. Secondly, complete contracts must be infeasible or undesirable. Thirdly, the creation of property rights may give rise to undesirable outcomes in subsequent periods. Using a multi-period analysis, public ownership may be justified in circumstances in which flexibility dominates commitment. The paper applies these ideas to an international analysis of ownership in several industries and finds that they are informative about both observed patterns and factors that are prompting change.

JEL Classification: G10

Non-Technical Summary

The trend towards privatising state owned enterprises has become worldwide. Privatisation is being actively discussed or promoted in Austria, France, Italy, Japan and Spain amongst many other countries. In Britain, we have come to expect periods of nationalisation to be followed by denationalisation as political fashions alter. But even by British standards, the size and scope of recent transfers from public to private ownership have been unusual. It is thus particularly pertinent to note that as yet there is no coherent theory of ownership to guide policy. Is it desirable that public ownership should be in retreat?

The paper begins by arguing that the debate on privatisation is confused. Privatisation and nationalisation are descriptions of just one feature of corporate organization: the pattern of equity holdings in an industry. Public ownership is a restriction on the portfolio holdings of investors and privatisation is a relaxation of this restriction. Leaving aside problems created by mispricing of asset sales, a privatisation is a reallocation of equity holdings from equal to market determined distributions. In justifying state control, we are therefore looking for reasons for restricting individual equity investments.

The paper argues that three conditions are required to justify such restrictions. First, there must be concentration in supply or demand. This is analyzed in terms of the circumstances in which intermediation between investors and firms should occur or an agency should be imposed between consumers and firms. Both the intermediary and the agency correct distortions that might otherwise result from individual decision-taking. The intermediary undertakes monitoring of company investments: the agency monitors the quality of heterogeneous products. The intermediary coordinates the savings decisions of individuals and the agency coordinates consumption in markets that display network properties (for example, telecommunication and computer systems).

Concentration is thus a product of monitoring and coordination. But on their own these do not justify public ownership. It is only when the analysis is extended beyond a single period that ownership becomes an issue. In a multi-period context, concentration can lead to abuse of monopoly or monopsony power. The intermediary can exploit its monopoly to the detriment of the consumer and the agency can use its monopsony position to the detriment of investors. These potential abuses may make allocations of ownership and control relevant considerations. They are not, however, relevant if abuse can be stemmed by contracts. Therefore, a second condition for the relevance of ownership is that complete contracts should be infeasible or costly.

The appropriate allocation of ownership and control is dependent on the nature of the market. Private ownership provides the property rights required to encourage participation in first period investments. Public ownership, on the other hand, maintains greater flexibility in responding to second period demand requirements of consumers. Social ownership is thus of proper concern in circumstances in which the property rights of private ownership do not adequately reflect subsequent demand requirements of consumers. Conversely, public ownership does not create the incentives for first period investment. The third condition for public ownership is therefore that considerations of flexibility should outweigh those of commitment.

This is just an application of a problem of time consistency to questions of ownership. The conflict between commitment and flexibility arises in this context in circumstances in which markets are concentrated on the consumer or investor side, the writing of complete contracts is infeasible, and ownership can result in inadequate investment incentives or inappropriate production and distribution decisions.

These ideas are applied to patterns of ownership that are observed in several industries in different countries. A theory of ownership should be able to explain a number of stylized observations about ownership: (i) public ownership is consistently higher in some industries than others; (ii) in certain industries there are considerable variations in ownership patterns across countries; (iii) with some notable exceptions, proportions of domestic production that are state owned are broadly similar in several countries; and (iv) privatisation is being particularly actively pursued in certain industries. The paper suggests that these patterns can in large part be explained in terms of a resolution of the benefits of flexibility and commitment.

The paper ends on a note of caution. The association of private property with commitment and public ownership with flexibility may be undermined by imperfections in capital markets and the organization of government. In particular, once a separation between ownership and control is introduced, then the same problems of commitment that are a feature of public ownership may occur in private companies. Competition in financial markets may discourage investors from making long-term credible commitments. Conversely, the absence of competition in government administration and life-time forms of employment may permit state controlled organizations to implement investment projects that private capital markets would not.

Students of privatisation encounter a formidable hurdle when they investigate one of the most important political issues of the 1980's. Why is public ownership everywhere in retreat? It is easy to provide a list of factors cited or suggested by governments: efficiency, revenue, market allocations, political fashion, restraint of unions and private share ownership. While these raise many interesting questions about industrial organization, public finance and labour relations, they do not provide much insight into motives for particular forms of ownership. The same criticism applies to the arguments originally presented for state ownership. Monopoly, distribution, quality regulation, public goods, security and macroeconomic policy have all been mentioned in the context of nationalization. But again the relation between these issues and ownership is at best obscure. What we currently lack is a theory of ownership which informs the policy maker of the appropriate degree of public involvement in a particular industry. Without such a framework, fashions that embrace state and private ownership in turn will continue to dictate practice. If for no other reason than the significant transition costs of switching ownership patterns (see Mayer and Meadowcroft (1985)), practices should be determined by more fundamental considerations than fashion. This article will attempt to provide a framework for analyzing ownership.

The approach that this paper follows is straightforward. The central argument is that public ownership is a statement about restrictions on the portfolio allocations of investors. What privatisation has done is to shift equity holdings of the public between an initial imposed equal shareholding of all members of the population to one in which individual

preferences determine the distribution of holdings. Abstracting from underpricing, those who have not subscribed to privatisation issues have sold their holdings to investors. Is this process desirable? If it is then a strong prima facie case for privatisation exists. All other considerations that suggest public ownership have to be framed in terms of the costs of free choice of portfolio investments. If such arguments cannot be presented in these terms then ownership is not the relevant consideration.

As usual, in trying to determine whether market processes should be corrected or constrained, we are searching for possible externalities. This paper suggests that there is one important class of externalities arising from divergences in interests between investors and consumers. That public ownership is regarded as the resolution of conflicts between producer and consumer is hardly novel. The insight that this paper seeks to provide is that a better understanding can be obtained by focusing on the conflicts that arise in an intertemporal context. That requires a more explicit consideration of savings and investment than has been provided to date.

The arguments in this paper have been alluded to in two previous papers, Mayer (1985a and b); this is an elaboration of the issues raised there. The paper is an application of a general class of models concerned with the resolution of the conflict between choice and commitment. This topic has been discussed in several other contexts and is being actively pursued as part of an international study of corporate finance and

investment (see Mayer (1987)) The presentation here is informal but more formal models are becoming available (see Bray (1986)).

Section 1 sets out a stylized description of market structures. It discusses the externalities that may arise in savings decisions of individuals and argues that there are circumstances in which the imposition of intermediaries between investor and firm may be warranted. Section 1 then repeats the exercise for consumers and suggests that the introduction of an agency between consumer and producer may be desirable. These intermediaries and agencies then provide the basis for concentration in supply or demand creating possible abuses of power. However, the relevance of these abuses to ownership only becomes clear in a multi-period framework.

Section 2 broadens the discussion to an intertemporal setting. It considers the conflicts that can arise between consumer and investor in cases in which competition is restricted for the reasons described in section 1. It notes that while the interests of consumers are furthered by the maintenance of flexibility in production and distribution, restrictions on flexibility are required to promote investment. The relative merits of private and public ownership are seen as a resolution of this conflict.

Section 3 exemplifies these considerations in relation to ownership patterns in particular industries in different countries. It notes a number of common features of ownership and relates the theory of the

previous sections to these stylized descriptions. It suggests that many features of ownership can be explained in terms of the theory outlined. However, it ends by noting that the primary allocation of roles to private and public ownership of enforcement of commitment and maintenance of flexibility respectively may be undermined in practice by imperfections in capital markets and the permanence of bureaucracies.

Section 4 of the paper concludes and summarizes.

The main results of the paper are:

(i) Public ownership should only be contemplated in industries in which monitoring or coordination create concentrated markets and the abuses to which such concentration may give rise cannot or should not be avoided by contractual arrangements.

(ii) Where a prima facie case for public ownership exists then consideration should be given to the relative importance that should be attached to flexibility in production or distribution and commitment to investment plans.

(iii) Neither private nor public ownership can be expected to be universally appropriate.

(iv) Public ownership is associated with industries in which flexibility is of dominant concern and private ownership will be preferred where

commitment is required to encourage investment.

(v) Changes in ownership will frequently be justified by technical innovation. A life cycle of ownership patterns may emerge.

(vi) Patterns of ownership across industries in different countries can be broadly explained by considerations of commitment and flexibility.

(vii) Sizes of product and capital markets will both influence preferred ownership patterns.

(viii) It is rarely appropriate for ownership to be the same at all stages of production in an industry. The preferred form of ownership is frequently opaque in circumstances in which disintegration is not an option.

(ix) The fundamental principles of ownership summarized in (i), (ii) and (iv) will not apply in circumstances in which financial markets fail to encourage corporate investment. Conversely, the structure of government administration may permit public corporations to make investment commitments.

1. The Organization of Production and Consumption.

The question that we want to answer is under what circumstances is it desirable for the portfolio allocations of investors to be constrained. We begin by considering a single period model in which there are no transaction costs, taxes, information asymmetries or costs of switching between firms or customers. Portfolio theory informs us that there exist optimal portfolio holdings of investors which reflect individual preferences between risk and return. For example, in two factor models, all investors hold the same portfolio of equity holdings but allocate different proportions of their portfolios between risky and riskless assets. More generally, holdings will reflect individual consumption and asset return patterns. Constraining portfolio holdings in this context unequivocally imposes welfare costs.

Firm specific earnings are irrelevant because diversification of portfolios eliminates all but systematic risk components (risk that is common to firms). But specific components no longer remain irrelevant if they can be identified ex ante or their ex post identification influences performance. If they can be, then ex ante selection and/or ex post outcomes can be improved. In the presence of quality variations and costly monitoring, insufficient monitoring will occur in the absence of a mechanism for internalizing the externality. That mechanism may take the form of an intermediary. In the former case performance can be improved through screening. In the latter case the improvement comes from relating incentives to performance thereby diminishing the costs associated with moral hazard. Screening or incentives therefore make identification of

individual qualities desirable. If identification is a costly process then the private collection of information on firm specific performance may be insufficient. There is an incentive to free ride which creates an externality in information collection.

This can be illustrated in terms of a diagram of investors and firms. In the absence of selection or incentive considerations, portfolio diversifications encourage individual holdings that are related to consumption requirements and expectations of investors (figure 1). Restrictions on allocations will be welfare diminishing. But if evaluations of individual firms can only be achieved at cost then the imposition of an intermediary between investors and firms is desirable (figure 2). The intermediary internalizes the externality associated with the incentive to free ride on screening or performance evaluation. The intermediary undertakes monitoring and through holding a diversified portfolio eliminates the requirement on investors to identify individual firm performance (see Diamond (1984)). Alternatively, firms conglomerate and introduce a hierarchical structure. Whether the intermediary is debt (a bank) or equity (a conglomerate) financed depends on the ability of investors to identify certain components of risk at low cost.

There is a second class of reasons for imposing an intermediary or layer of hierarchy between investors and firms. There may be an externality on

the investors side. The size of markets as measured by the number of shareholders may not be uniquely determined (Pagano (1987)). The extent to which portfolios can be diversified and thus the attraction of equities for risk averse investors is dependent on the number of participants in the market. Large markets are efficient in absorbing trades with small price adjustments and individuals only participate if they do not face inelastic supply schedules. This circularity creates the "network" effect of consumer markets in savings decisions.

Turning to the consumer side, freedom of choice is usually perceived as enhancing consumer welfare. But externalities in consumption undermine this result. Most obviously, externalities arise in consumer networks (for example, communication and computer systems) where the value of services provided to a particular individual are dependent on consumption decisions of others (see Farrell and Saloner (1985, 1986)). More generally, interrelationships in consumption occur in the presence of economies of scale and scope in production. In that case individual purchase decisions affect the costs of production of goods and services sold to others. In certain circumstances, coordination of consumption by a central agency is therefore required and the pure market relationship of figure 3 should then be modified to the agency structure of figure 4.

There may be other reasons for agencies. Analogous to the role of an intermediary in undertaking comparative firm evaluations, an agency is required to undertake analyses of heterogeneous (differentiated) products whose quality cannot be readily identified by consumers (for example,

health care or financial services). The raison d'etre of the agency rests on the superior skills of agents in undertaking quality analyses and avoidance of duplication of effort in assessments. The same free rider problem that afflicts investor monitoring undermines consumer quality assessments. As figures 1 to 4 suggest, there is a close symmetry between the factors encouraging the formation of agencies and intermediaries.

We have thus identified four classes of economy: the pure market economy of figures 1 and 3; the intermediated or hierarchy economy of figures 2 and 3; the agency economy of figures 1 and 4; and the non-market economy of figures 3 and 4. The appropriate structure for a particular product or economy involves a comparison of the relative benefits of freedom of choice in consumption and savings, monitoring of corporate performance and quality of consumer services, networks in consumption and savings, allocation of capital resources and economies of scale and scope. Intermediation and agency may therefore be justified; but as yet we have not provided a justification for the public ownership of these institutions.

2. A Question of Ownership

The failure to identify ownership arises from the absence of a distinguishing feature of savings or investment. This deficiency is a consequence of the single period nature of the discussion. The simplest way of

rectifying this omission is to imagine savers as making portfolio allocations in a first period which augment capital assets of firms in the second period. Consumers make their purchases on the basis of observed characteristics and prices of goods in both periods.

The pure market economy then corresponds to the standard textbook competitive market. Production and consumption can be separated and consumption allocated between the two periods with the normal welfare properties associated with a competitive economy. This is not true of the agency economy. Consider first the case in which savers are committed to the portfolio allocations that they make in the first period. In the second period, consumption decisions are coordinated or influenced by the agency. The agency has choice of supply from a range of producers each of which has capital in place that is dedicated to production in this sector. This imbalance in flexibility between producer and consumer permits the consumer agency to bid down prices offered in the market to the point at which only variable costs are covered. By threatening to take purchases elsewhere, the agency can not only prevent producers earning normal returns on the value of first period savings but, since in the second period capital invested has no value in alternative employment, it can drive returns down to zero. If this is anticipated in the first period then there will be no savings (assuming positive time preference). More generally, the imbalance between producers and consumers will result in underinvestment.

There are two ways in which this problem may be alleviated. Firstly, if

savers are not committed to portfolio allocations then the imbalance is eliminated. Sunk costs are now widely appreciated to be the complicating feature of capital and their absence allows desirable welfare properties to be reestablished. However, the discussion in the first section has indicated why mobility between markets may be limited i.e. why the market is monopsonistic. The presence of the agency restricts the number of alternative outlets for the producers goods. Secondly, contracts may be written that limit the second period discretion of the consumer agency. Indeed, given the first period underinvestment, consumers may well wish to be able to commit themselves to, for example, a second period allocation of purchases. The incentive to pursue "time inconsistent" actions results in contracts that precommit consumers as well as producers. But this is only feasible if outcomes in the second period are observable and verifiable. As Grossman and Hart (1986) have noted, the interesting issues of ownership surround unobservable or unverifiable not observable outcomes.

Reversing the argument suggests a similar problem facing consumers in the intermediated economy. Here the choice of the consumer is limited by the horizontal integration created by the intermediary. Competition in supply can only be achieved at cost and the advantages of integration present the consumer with monopoly supply. The distortion comes from the commitment of consumers to a particular producer without the reciprocal commitment being made by the producer. The producer can expropriate monopoly rents by threatening to transfer supply elsewhere.

In the absence of complete contracts, ownership can be used to resolve questions of jurisdiction over states for which contracts have not been written. In the first period ownership is established, which allows the party in control to determine actions in the second period. The other party is induced to participate through compensating payments in the first period. The question that arises is where does ownership reside. In the context of our analysis of consumers and producers, if the relevant description is anything other than the pure market economy either consumer or investor ownership may be appropriate.

As is well known from standard welfare analysis the problem of investor control is the inadequate account taken of consumer interests. This is captured in the deadweight loss of excessive pricing and insufficient output. But consumer control introduces its own distortion of inadequate regard for the returns to investment. The essential conflict that this analysis highlights is between achieving desirable allocations across individuals in a particular time period and appropriate intertemporal allocations. Precontracting can only resolve this to the extent that adequate information exists on which to base settlements. If this is infeasible then control has to be established a priori.

The allocation of property rights is determined by the relative importance of flexibility and commitment. The greater the benefit to be derived from flexibility in coordination of second period consumption, the greater the value placed on consumer control. In cases in which there are externalities in consumption and there is uncertainty surrounding second

period preferences, the avoidance of commitment to particular distributions may be of substantial value. On the other hand, the greater the effects of choice of first period investments on second period performance, the stronger is the case for retaining investor control and limiting second period flexibility. In this case, commitment is required to elicit appropriate investment decisions.

The case for social ownership rests on the failure of private ownership to achieve appropriate levels of both first period investment and second period distribution. Ownership patterns that are the product of private investment decisions in the first period will elicit inadequate investment in circumstances in which externalities in second period consumption warrant coordination of consumer behaviour. The potential expropriation of returns by the consumer agency undermine attempts to separate the investment and consumption decision. Conversely, the intermediated economy permits the investor to capture returns to savings but only at the expense of second period consumption. In both cases ownership patterns that are established by private savings decisions are inappropriate. Consumers in the agency economy should take greater account of first period investment requirements; the interests of investors in the intermediated economy should be more closely aligned to those of second period consumers. There are therefore externalities in ownership that provide a prima facie case for adjustments to private ownership patterns.

Social ownership will be defined as appropriate in circumstances in which first period private ownership patterns should reflect second period

social consumption preferences. The above discussion has suggested the conditions under which it will be warranted. First, externalities in consumption and savings decisions create monopoly or monopsony market structures. Secondly, costs or infeasibility of contracting prevent the signing of complete contracts. Thirdly, the assignment of property rights to either consumers or investors will not elicit appropriate investment or consumption decisions. Flexibility in second period decision-taking necessitates limitations on investor control; conversely, consumers have to display a degree of first period commitment to investment decisions. Were the latter not true then state involvement to correct an externality would be warranted but not public ownership. The greater the benefits of flexibility, the larger the divergences from private ownership; the greater the benefits to be derived from commitment, the closer should a market or economy approximate to private ownership.

It should be noted at the outset that regulation does not avoid the ownership questions that are raised here. Where regulation takes the form of pre-specified rules pertaining, for example, to rates of return, then this is no different from precontracting over specific aspects of an industry's activities. As usual to the extent that contracting is feasible and not restrictive then it probably dominates public ownership. The valid concern that is usually expressed about regulation is that the restrictions associated with this form of contracting are usually far from innocuous. Outcomes may well justify different prices, more or less favourable to investors. This observation that rules are frequently inappropriate is hardly surprising in the light of the function of

flexibility that we are associating with public ownership.

Alternatively, regulation may take a more discretionary form. This has recently become a common feature of the privatisation process in the U.K. The powers conferred on OFTEL and OFGAS extend beyond the implementation of pricing rules to broader issues concerned with the maintenance of the public interest. There are two possible scenarios. The first is that the regulatory body is effective in which case the same problems of expropriation of returns to private investors that are normally associated with agency markets are encountered. The second is that the regulatory agency is ineffective in which case flexibility is not achieved.

Likewise, other procedures that have been proposed for avoiding abuses of private ownership really only disguise the central issues. For example, franchising may prevent investors from earning predictable monopoly rents but does not correct the abuses that can stem from unpredictable events. The motorway restaurant that benefits from unanticipated declines in oil prices is not prospering in an ex ante sense but is still mispricing ex post. If continuous franchising is feasible then the distortion is eliminated but a problem of inadequate investment is created.

To summarize, it has been argued that issues of ownership arise in circumstances in which concentration of the allocation of savings or consumer resources is justified by the desirability of coordinating investor and consumer behaviour or undertaking comparisons of firm behaviour either from the perspective of quality of investment or quality

of production. Where contracts can be written that adequately account for future outcomes then ownership is again not at issue. However, where this is infeasible then the resolution of outcomes in the event of unforeseen or unverifiable states is achieved through prior allocation of property rights. In general the allocation is not a matter of indifference since the benefits of control will not be the same for the two parties. In particular the conflict between consumer and investor is one of appropriate cross-sectional as against intertemporal allocations. In certain cases, the benefits of flexibility outweigh those of commitment; in others, the ordering is reversed. The appropriate allocation of ownership is dependent on this ranking : private property rights provide commitment; public ownership retains flexibility.

The above analysis defines circumstances in which ownership questions arise and the appropriate allocation of ownership. The implication is that neither public nor private ownership should be expected to be universally appropriate. The conditions giving rise to monopolistic and monopsonistic market structures, the ease with which contracts can be written and the benefits to be derived from commitment as against flexibility can be expected to vary across markets, time and localities. The next section of the paper therefore turns to an application of the principles described above to specific cases in which public ownership is frequently discussed.

3. Ownership Patterns in Practice.

A first look at ownership is to say the least confusing. To take the electricity industry as an example, ownership varies between the Austrian, French, and British cases of virtual complete state control through the Dutch, German and Swedish cases of predominantly state and local ownership to the private domination of the Belgian and Spanish industries. On the other hand, telecommunications has been state controlled, with the notable exceptions of Canada, the U.S. and now the U.K.

Within industries, there are substantial variations in ownership. The transmission of electricity is predominantly a public activity in most countries while its production and distribution have a significant private component in Belgium, Germany, Spain and Sweden. Gas transmission is entirely privately controlled in Germany and partially privately owned in Belgium and the Netherlands. Gas is at least in part privately produced in Italy, Spain and Sweden, as well as Belgium, Germany and the Netherlands.

A more careful assessment reveals some common features of ownership. Figure 5 records ownership patterns of a number of industries. At one extreme postal services are almost universally in public ownership. Railways are the next most widely publicly controlled industry with complete public ownership in all the countries shown with the exceptions of Canada, Japan and the U.S. Telecommunications as noted above have been predominantly in the public sector of most countries. Airlines, electric-

ity and gas display a substantial degree of public ownership in a number of countries but little or none in others. At the other extreme, cars, coal, oil, shipbuilding and steel are state controlled in only a few countries.

Furthermore, while there are important variations in ownership patterns within industries, total shares of public corporations are quite similar across several countries. There are serious problems involved in trying to undertake international comparisons of the sizes of public enterprises. Definitions of public ownership differ across countries and the allocation of particular enterprises between the public and private sector is frequently arbitrary. Data are not always available: for example, Belgian statistics do not record output of public enterprises. In some cases output is measured in terms of value added and in others by gross output. Figures on the relative shares of public sectors, therefore, have to be treated with considerable caution. But to the extent that they can be taken seriously, they do not suggest pronounced variations in the contribution of public enterprises to domestic production for the countries shown (figure 6). However, referring back to figure 5 it is clear that there are some pronounced exceptions: Canada, Japan and the U.S.A have an unusually small share of their domestic production in the public sector.

There are, therefore, a number of stylized facts that the theory discussed in the previous sections should be able to explain. Firstly, some industries display very much more pronounced public ownership than others. Secondly, there is considerable variation in ownership patterns across countries in certain industries. Thirdly, with some notable exceptions there are broad similarities in the proportion of domestic production of several countries that is publicly owned. Finally, privatisation has been more widely advocated for some industries than others. In particular, privatisation of telecommunications is currently under discussion or has recently been implemented in France, Italy, Japan, Spain and the UK and liberalization is in prospect in several others. Privatisation of electricity is being seriously contemplated in Germany, Spain and the U.K..

Figure 7 attempts to apply the three criteria of ownership listed in the previous section to a number of the industries mentioned above. It categorizes industries by market structure, ease of contracting and relative importance of commitment and flexibility. Inevitably, these classifications are broad brushed and open to debate. They do, however, illustrate how the principles of ownership described above can be applied in practice.

We begin with the industry that displays the highest level of public ownership: the post office. The primary public good aspect of postal services comes from the consumer network system. In terms of the above discussion, this justifies the existence of an agency that coordinates services provided. The major uncertainty in the industry comes from levels of demand for specific services and this uncertainty requires flexibility in supply and allocation of resources. There has to date been little technological innovation, though with electronic mail it is likely that this will change appreciably over the next few years. In the absence of technological uncertainty, there is limited scope for contracts to specify responses in different circumstances but this is restricted by demand uncertainty. An industry in which there is an important role for a coordinating agency and little technological uncertainty is, according to the above discussion, precisely one in which public ownership is likely to be appropriate.

There are, however, several questions that have to be pursued further. Firstly, to the extent that technological uncertainty is increasing in importance in the postal industry then the balance of ownership will shift in the direction of private control. We illustrate this in relation to several industries below. Secondly, to date we have taken the definit-

ion of the postal industry as given. It is by no means obvious that the form of ownership of all parts of a post office should be the same. The network nature of postal services arises at two levels - collection/delivery and sorting - and is more relevant to letters than parcels. Contractual arrangements cannot be used to avoid the distortions that might arise through demand changes necessitating supply responses. In such circumstances a monopolist supplier of networking services will be able to exploit its position in relation to final consumers. The maintenance of the public interest argues in favour of the retention of these activities in the public sector. Peripheral services, such as counters and special deliveries could then be competitively supplied, provided that the public agency's supply monopoly could not be employed to the detriment of the suppliers of these services.

The above description of an industry in which there is a core component that has a network quality with input and output activities operating around it is relevant to several cases. In railways, the primary network component obviously comes from the permanent way. But in addition it arises at the consumer end in the form of stations. Railways are therefore agency markets in which demand considerations require flexibility in recontracting and there is only limited scope for the introduction of a private element. Where there may be room for privatisation is in the provision of passenger and freight services. The operation of private rolling stock on both private and public tracks is a feature of some overseas rail systems (e.g. in Japan). But even here there is an important public good in the form of timetables. Until technical innovation

becomes more pronounced, railways will probably for the most part be retained in the public sector.

Telecommunications illustrate the way in which technical progress can alter the appropriate form of ownership. Until recently they have displayed most of the features of an agency industry described above with networks in the form of national transmission and switching systems. But technical progress has been faster in this industry than in those described to date. As a consequence the form of uncertainty is no longer restricted to considerations of demand. Technical changes have been particularly prominent at the domestic and value-added network service (VANS) end of the market. But in addition changes in exchange equipment and the introduction of cable and satellite communication have introduced an element of technological uncertainty into the transmission and switching activities of the industry. While therefore until the 1980's the public ownership of telecommunications could be justified on the same network considerations as the other utilities industries, this is now far from evident. Encouragement of investment in the industry may have swung the balance of ownership in favour of a private one that permits the gains from investments to be captured. It is not then surprising to find that the primary motivation behind the government's decision to privatize British Telecom related to the ability of the company to raise capital for investment.

This change in ownership is particularly appropriate if abuses of monopoly can be avoided through structural changes in the industry.

Recall that the question of public ownership only arises in circumstances in which intermediaries or agencies are required. There are few grounds for believing that monitoring of investment or production decisions of telephone companies justify monopoly supply or monopsonistic purchase. The only area in which a public ownership question would appear to arise is in the networking service associated with the transmission system itself. But even here it has been noted that technological innovation has in many cases diminished the costs of introducing competition. Optic-fibre as well as satellite services offer alternatives that could at least in part avoid the worst abuses of monopoly in national and local networks. Whether this is indeed the case depends on the way in which competition is fostered between the different systems. The involvement of British Telecom in the newly established cable systems and limitations on competition between cable and telecommunications services have cast doubt on the extent to which competition will indeed emerge in the U.K.

The cases of gas and electricity differ on account of the large capital expenditures involved in generation. The grounds for introducing private property rights are therefore stronger in these industries than postal and railway services and telecommunications before the technical innovations of the 1980's. They are, however, complicated by the imposition of the national grid between producer and consumer. Not unexpectedly then the choice between private and public ownership has proven less clear cut in these than other industries. But technical progress is tending to shift the balance of advantage in these industries too. Here the major innovations are coming from the introduction of international trade in

gas and electricity which is diminishing the distortions that are otherwise associated with public ownership of the national grid and permitting the privatisation of other parts of the industry.

Telecommunications, gas and electricity illustrate the fact that the size of the product market is intimately related to appropriate ownership patterns. Section 1 noted that the size of a capital market is an important determinant of its efficiency in absorbing trades in securities without sustaining price fluctuations. The ability of industries to accommodate more than one producer is therefore dependent on the sizes of both capital and product markets. This goes some way towards explaining the smaller shares of public enterprises in Canada, Japan and the U.S.A. It might also not be entirely unrelated to the observation that the country in which privatisation is being most actively pursued is the one in which capital market innovations are most pronounced.

In sum, both patterns of ownership observed in different countries and the forces prompting change are readily explicable within the framework outlined above. Public ownership is common in industries in which externalities in consumption are combined with a requirement that there be flexibility in responding to demand requirements. Private ownership dominates in circumstances in which technological advances and production requirements necessitate capital expenditures. The property rights of private ownership encourage risk taking and investment but then introduce a rigidity in subsequent production and distribution activities. What might then be expected to be observed is a life cycle in ownership

patterns with private ownership occurring in the early phases of technological innovation and public control being exerted thereafter as investment considerations diminish in significance in relation to demand responses.

There are, however, two important assumptions implicit in the above: (i) capital markets succeed in bearing risks and (ii) the government is not an institution that can credibly make commitments. The justification for the former was the establishment of property rights. That right can, of course, be abused; however, such explicit forms of expropriation take us outside of the subject of this article. The reasoning behind the latter was that public control in large part reflects current preferences. Obviously, there are forms of government that avoid the implementation of public preferences but again that is not in the spirit of this article. Even leaving aside these extremes, there are serious questions that should be raised about the stylized contrast between private commitment and public flexibility. These introduce broader considerations about the function of public ownership.

I have argued at length elsewhere (Mayer (1987)) that there are features of capital markets that may make them inherently poor at risk taking. The reasoning behind that statement comes from the observation that the providers and users of risk capital are frequently different groups of individuals. In our characterization of the capital market we viewed ownership and control as residing with investors. If that is not the case then account has to be taken of the relationship between investor and

manager in terms of commitments and flexibility. The term that is usually used for flexibility in financial markets is liquidity and liquidity is invariably associated with market efficiency. The primary motivation behind financial innovation and deregulation has been the extension of market liquidity. But stated in these terms liquidity may not be consistent with the advantages that we have associated with the establishment of property rights. What liquidity does is to undermine the ability of investors to commit themselves to particular investment decisions made by firms. This is reflected in the absence of commitment in short term financial instruments and in equity capital in which there is an active market for companies.¹

The problem that markets encounter is that competition encourages the provision of financial services that have high current valuations. Ex ante investors would like to be able to commit themselves to investments that offer high returns and are willing to provide the incentives for firms to implement such projects. Ex post, there is an incentive on investors to bid down the returns to corporate risk takers. This gives rise to what are widely perceived to be capital market failures. Limitations on the provision of financial services and corporate control can encourage the development of longer term relationships. But capital markets will not of their own accord restrict competition in this way. There is an externality arising from the divergence of current private interests from wider longer term considerations.

1. The reader is referred to Mayer (1987) for a more detailed discussion of these points.

This conflict is avoided through the establishment of institutions which are not subject to the competitive forces of market processes. The classic example of such an institution is the civil service. Its primary characteristics that permit it to fulfil this function are an absence of a market in corporate control and its life time tenure system of employment. Performance of employees is not as a consequence measured in short term considerations that are the basis of success and failure in private employment. In particular rewards are not in large part based on outturn performance but inputs of effort and skills. In terms of the discussion of the previous sections rewards reflect ex ante assessments of inputs not ex post measures of output. The monitoring and incentive systems that are a feature of many governments therefore act to encourage precisely the aspects of commitment that we have associated with private ownership.

At the end of the day there is some irony in concluding that the basic rationale behind private ownership may in fact justify public control. The function of the market in encouraging risk taking and investment may be undermined by capital market failures that have very fundamental underlying causes. The resolution of these failures may be found in restrictions on competition that are a feature of many government bureaucracies. The conclusion that governments may be called upon to provide the commitments required for long term investments accords with some popular conceptions. What acts to undermine this conclusion is competition in the electoral process replacing a market for corporate control with its political counterpart. Elected governments may be able

to establish reputations that make commitments credible but competition in the electoral process would appear to limit this possibility. Where the balance of advantage in long term decision taking lies is therefore seen to be intimately tied up with the political process and institutional structure of a particular country.

These considerations clarify why public involvement in financial systems is so often associated with economic development. Such involvement may be explicit as in the case of France and Italy or more implicit in the case of Japan. The justification for public ownership of the financial sector goes beyond simple statements about monopoly control over the payment system or distributional considerations to more fundamental questions about the inducements to long term investment. Restrictions on competition can of course merely encourage inefficient practices. But the naive assertion that public provision is inefficient and private provision is efficient misses the point. Efficiency is inappropriately measured by currently observed criteria. What is efficient in the present period may be highly deleterious in the longer term. In any event the industries that are the subject of study of this article are precisely those in which competition in production is undermined by coordination and monitoring considerations. The central question is what institutional structure is best placed to undertake the monitoring of activities that are not supplied in the market place. While economic theory suggests that this is the proper function of private ownership and the capital market, practice might well dictate otherwise.

4. Conclusion

This article has attempted to establish a case for public ownership from first principles. It has argued that the only factor that is relevant to ownership per se is control. Public ownership is a restriction on equity investments in corporations and a rationale for public ownership has to be sought in a justification for such restrictions. The myriad of other issues that have been discussed in relation to privatisation only serve to cloud the debate.

The approach of this paper has been to define circumstances in which a prima facie case for public ownership can be provided. It noted that a basic requirement is that considerations of coordination and monitoring warrant the involvement of an intermediary between investors and firm or an agent of consumers. The issue of public ownership does not arise where the pure market description of an industry or economy applies. In the intermediated, agency or non-market economy attention has to be given to contracting and ownership.

Again ownership is not the relevant consideration in circumstances in which contracts can be written that establish appropriate outcomes. The interesting cases are those in which contracts are infeasible or impose an unwarranted inflexibility in future relationships. Where competition is circumscribed and contracting limited the relative merits of public

and private ownership have to be carefully balanced. What private ownership provides is protection of property rights that encourages inputs of investment and effort. What public ownership supplies is a greater degree of flexibility in determining production and distribution in subsequent periods. The conflict between public and private ownership is therefore the familiar one between commitment and flexibility.

This leads to a powerful set of predictions as to the circumstances in which one form of ownership will be preferred. Restricting attention to industries and economies in which the prima facie case can be made, public ownership is expected to be most widely associated with industries in which (i) technical innovation is slow (ii) investment expenditures are modest and (iii) demand requirements are unpredictable. These considerations lead to a ranking of public ownership which is quite consistent with observed patterns; for example, postal services and railways displayed the highest degree of state control of any of the industries examined.

The analysis leads to a number of predictions. Firstly, ownership patterns are unlikely to be stable over time. Periods of technical innovation will be most closely associated with private ownership. Life cycles of ownership will probably be encountered as technical progress intensifies and wanes. Secondly, the relevance of public ownership will be at least in part related to the sizes of economies and the development of their capital markets.

What then should be our verdict on the current wave of privatisation? The first implication is that changes in ownership will periodically be warranted. The Conservative government in the U.K. has not discovered a new principle of ownership. It is merely responding to strong pressures of technical change in product and financial markets. Its drive to extend the process to industries in which such innovation is less in evidence is more questionable. A clear case for one particular ownership pattern has not emerged in circumstances in which these industries remain integrated. This would not have been true had a more radical approach been pursued in which the constituent parts of the relevant industries been separated.

But the above analysis of patterns of ownership is complicated by inefficiencies in financial markets and the process of government. The association of commitment and flexibility with private and public ownership respectively may not apply. The very forces that promote efficiency in financial markets may undermine their ability to take long term decisions. Conversely, the stability of bureaucracies and their procedures for evaluating and rewarding performance may permit governments to make credible commitments. The significance of this reversal of roles requires considerably more research but it is hoped that this article provides at least some base against which to evaluate our current state of ignorance.

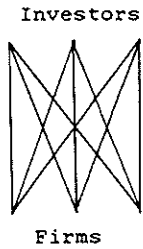


Figure 1

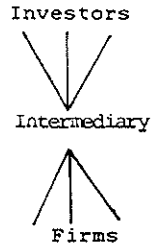


Figure 2

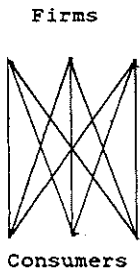


Figure 3

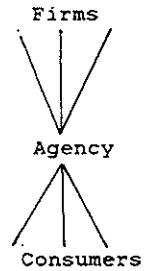


Figure 4

Figure 5

Public Ownership in OECD Countries in 1983

	Airlines	Cars	Coal	Electricity	Gas	Oil	Posts	Railways	Shipbuilding	Steel	Telecommunications	Country Average
Australia	3	1	1	5	5	1	5	5	n.a.	1	5	3.2
Austria	5	5	5	5	5	5	5	5	n.a.	5	5	5.0
Belgium	5	1	1	2	2	n.a.	5	5	1	4	5	3.0
Britain	4	3	5	5	5	1	5	5	5	4	1	3.9
Canada	4	1	1	1	1	1	4	4	1	1	2	2.3
France	4	5	5	5	5	n.a.	5	5	1	4	5	4.4
West Germany	5	2	3	4	3	2	5	5	2	1	5	3.4
Holland	4	3	n.a.	4	4	4	5	5	1	2	5	3.7
Italy	5	2	n.a.	4	5	n.a.	5	5	4	4	5	4.3
Japan	2	1	1	1	1	n.a.	5	4	1	1	3	2.0
Spain	5	1	3	1	4	n.a.	5	5	4	3	3	3.4
Sweden	3	1	n.a.	3	5	n.a.	5	5	4	4	5	3.9
Switzerland	2	1	n.a.	5	5	n.a.	5	5	n.a.	1	5	3.6
United States	1	1	1	1	1	1	5	2	1	1	1	1.5
Industry Average	3.7	2.0	2.6	3.6	3.6	1.8	5.0	4.6	2.3	2.5	3.9	3.2

Degree of Public Ownership

1 = Less than 25%

2 = 25%

3 = 50%

4 = 75%

5 = Greater than 75%

Source: The American Express (AMEX) Bank Review (1985).

Figure 6

Proportion of Output and Investment in 1982 Attributable to Public Enterprises

(percentages)

	Output	Investment
Austria	17.8	21.1
Belgium	na	15.0
France	17.6	34.3
Germany	10.7	14.7
United Kingdom	11.2	17.1

Source: Parris, Pestieau and Saynor (1987)

Figure 7

Determinants of Ownership in Five Industries
in Integrated and Disintegrated Form

	Structure of Market	Ease of Contracting	Relative Importance of Flexibility and Commitment	Ownership
<u>Post Office</u>	Agency	Limited	Flexibility	Public
(i) Counters	Market	n.a.	n.a.	Private
(ii) Sorting	Agency	Limited	Flexibility	Public
(iii) Delivery	Market/Agency	Limited	Flexibility	Unclear
<u>Railways</u>	Agency	Limited	Flexibility	Public
(i) Permanent Way	Agency	Limited	Flexibility	Public or contracted
(ii) Rolling stock	Market	n.a.	n.a.	Private
(iii) Stations	Agency	Limited	Flexibility	Public
<u>Telecommunications</u>	Agency or Intermediary	Difficult	Flexibility or Commitment	Unclear
(i) Local	Market/Agency	Difficult	Flexibility	Unclear
(ii) Network	Agency	Difficult	Flexibility	Public
(iii) Equipment	Market	n.a.	n.a.	Private
<u>Electricity/Gas</u>	Agency or Intermediary	Difficult	Flexibility or Commitment	Unclear
(i) Generators	Intermediary	Difficult	Commitment	Private
(ii) Grid	Agency	Difficult	Flexibility	Public
(iii) Local Distribution	Market/Agency	Difficult	Flexibility	Unclear
(iv) Appliances	Market	n.a.	n.a.	Private

References

- American Express Bank Review (1986), "Privatisation: a powerful worldwide trend", 13.
- Bray, M. (1986), "Uncertainty and the cost of capital: a multi-period model of bank lending", mimeo.
- Diamond, D. (1984), "Financial intermediation and delegated monitoring", Review of Economic Studies, 51, 393-414.
- Farrell, J. and G. Saloner (1985), "Standardization, compatibility and innovation", Rand Journal of Economics, 16, 70-83.
- Grossman, S.J. and O.D. Hart (1986), "The costs and benefits of ownership a theory of vertical and lateral integration", Journal of Political Economy, 94, 691-719.
- Mayer, C.P. (1985a), "Pitfalls in public policy: profits or props", Political Quarterly, 56, 142-57.
- Mayer, C.P. (1985b), "Recent developments in industrial economics and their implications for policy", Oxford Review of Economic Policy, 1, 1-24.
- Mayer, C.P. (1987), "New issues in corporate finance", Centre for Economic Policy Research discussion paper.
- Mayer, C.P. and S. Meadowcroft (1985), "Selling public assets: techniques and financial implications", Fiscal Studies, 6, 42-56.
- Pagano M. (1987), "Market size, the informational content of stock prices and risk: a multi-asset model and some evidence" Centre for Economic Policy Research discussion paper no. 144.
- Parris H., P. Pestieau and P. Saynor (1987), Public Enterprise in Western Europe, London : Croom Helm.