SWP 59/89 ORGANISATIONAL STATUS AND PERFORMANCE: THE EFFECTS ON EMPLOYMENT

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Organisational Status and Performance: Some Empirical Results

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Introduction[1]

This paper reports empirical work on the relationship between organisational status and performance in the UK. There is a belief that a change from public to private ownership (privatisation) results in improved performance. However, ownership is only an element in a complex model determining performance. Other variables include the extent of competition, internal management incentives and structures, and the external environment as reflected in government economic policy and expectations (e.g. the enterprise culture, the level of taxation). On this basis, a change in the status of an organisation associated with different managerial incentives and internal structures, without any change in ownership, may account for a change in performance. Some commentators, though, believe that managerial incentives and internal structures are inter-related with ownership.

Organisational status is viewed as a spectrum embracing changes within the UK public sector from a government department to a trading fund or to a public corporation, as well as changes in ownership between the public and private sectors (privatisation and nationalisation). Hypotheses on the relationship between a change in organisational status or in ownership and improved performance raise questions about why the change has arisen and how such hypotheses might be tested. Since the relevant analytical framework has been presented elsewhere, (Dunsire, et al, 1988) the current

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paper focuses on empirical testing. The analytical basis of the central hypothesis is outlined briefly, and the various performance measures are reviewed after which the paper describes the sample of UK organisations studied and presents the empirical results, on the productivity and employment effects of changes in organisational status.

The Hypothesis

Why might performance be related to organisational status including ownership? Economists have focused on the differences in incentives between public and private organisations arising from differences in the ability of owners to monitor managers: a problem which arises when the goals of principals and agents diverge. In the property rights literature, it is argued that organisations with private property rights will have higher efficiency leading to more profit than organisations in the public sector where rights to profit are diffused and unclear (Alchian and Demsetz, 1972; Furubotn and Pejovich, 1974; De Alessi, 1980). Even in private sector joint stock companies where there is a divorce between management and ownership (directors and shareholders), property rights theorists suggest that the private capital market and the threat of takeover limit managerial discretionary behaviour. The absence of similar transferable property rights in public sector assets means that there is no comparable takeover threat (Alchian, 1965).

An additional dimension is provided by public choice theory which suggests inefficiency and waste in government reflected in rent-seeking, over-manning and an easier life in the public sector (government failure: Mitchell, 1988). However, both the property rights and public choice approaches are largely based on a priori reasoning and lack firm empirical support. In addition, the variety of organisational forms in the public and private sectors raises questions about the value and applicability of broad public versus private comparisons. The property rights and public choice literatures have little to say about the performance differences between organisations within the public and private sectors; although it follows from the literature that when rights to profits become more attenuated efficiency will decline. Similarly, in managerial economics the more discretion that management has to pursue non-profit goals the less

efficient the organisation is likely to be (Williamson, 1964; Leibenstein, 1966).

In this study we are interested in investigating the effects of changes in organisational status both within the public sector and between the public and private sectors in the UK. Figure 1 summarises our approach. On the west to east axis of Figure 1 are positioned certain organisational forms intended to represent the main types in the public and private sectors, namely, government department, quasi-governmental agencies, public corporations, hybrids, private sector PLCs (public limited companies) and owner-managed firms. They are broad categories, but further subdivision is unnecessary for our analysis.

Figure 1 Here

A government department is positioned in the far west of Figure 1. Its main feature is direct political control. According to public choice theory this organisational form should suffer from short-term political goals, damaging political intervention in decision making, bureaucratic self-seeking (e.g. tenure) and a lack of entrepreneurship. The next category is the quasi-governmental agency, incorporating 'quangos' and trading funds such as the Royal Mint and HMSO. Trading funds remain responsible to a government minister but are expected to finance their operations commercially by charging for goods and services instead of being dependent, like government departments, on annual Parliamentary votes and appropriations. Quasi-governmental agencies were created to reduce political intervention and to produce a more commercially orientated management of resources. The expectation is that such agencies will use resources more efficiently than government departments, so that transferring functions to non-departmental agencies increases managerial independence and hence efficiency (a proposition which is the basis of current UK policy to move within the civil service from bureau to agency status).

Public corporations were established to operate at even more 'arms length' from government; a constitutional relationship which was intended to combine efficient management with accountability (Morrison, 1933). A UK

public corporation is a corporate body which can sue and be sued; it can hold property in its own right; almost all external financing is in the form of loan stock guaranteed by the government; and its employees are not civil servants. Political control comes through the issuing of ministerial directives and through the appointment and dismissal of members of the corporation boards. In principle, public corporations are further removed from direct political intervention than other non-governmental agencies, with the boards responsible for day-to-day management and for agreeing longer-term corporate strategy with the government. This relationship was intended to promote commercial operations and efficient management and to remove the threat of harmful political interference. In practice, the division of responsibilities between corporation boards and ministers has been a source of conflict (NEDO, 1976) and since board members are salaried and cannot appropriate profits, this may dull incentives to be efficient. Nevertheless, our hypothesis derived from the public choice and property rights literature, and as represented in Figure 1, is that a movement eastwards within the public sector raises efficiency.

Within the private sector, the sole proprietor business where property rights are unattenuated so that there is maximum incentive to achieve profit by operating efficiently is located in the far east of Figure 1. This broad heading also includes private companies and partnerships where there is a negligible principal and agent problem. Moving west, the next category is the public joint stock company where ownership and control are divorced but property rights theorists suggest that the capital market constraint, the threat of takeover, constrains managerial behaviour. Finally, at the interface between the public and private sectors is a hybrid group, including those organisations which do not neatly fit into the other categories. Examples include not-for-profit organisations such as charities, clubs, mutuals and churches; private sector companies receiving appreciable government subsidy; and perhaps firms highly dependent upon government contracts. Although this study does not test the effects of changes of organisational status within the private sector, our schema, which is consistent with the property rights and public choice literature, suggests that organisational changes will have their most profound effect on performance the further the distance organisations move

on the west to east axis (for a fuller discussion of the schema, see Dunsire et al, 1988).

In addition to formal organisational status, another possible determinant of performance is competition in the product market (Caves and Christensen, 1980; Millward and Parker, 1983; Parker, 1985; Kay and Thompson, 1986). A firm may remain in business and be inefficient if the market is neither contested nor contestable. The scope for non-profit maximising behaviour declines the more competitive is the product market. Also, some government departments and agencies hold monopoly rights over the provision of goods and services, which might be expected to reduce both allocative and productive efficiency. In Figure 1 movement down the north-south axis represents an increase in the degree of competition, with monopoly and perfect competition identified as extremes. Thus, in Figure 1 organisations are constrained both by their organisational status and their product market. An organisation's position within the ABXY space can now be plotted and hypotheses regarding performance changes established. For example, a private sector natural monopoly will be positioned in the north-east with ownership incentives to be efficient but with no product market competition. A monopolistic public enterprise by comparison will lie in the north-west, suggesting the existence of neither ownership nor product market pressures to be efficient. The south-east and south-west quadrants contain competitive private and public enterprises, respectively. The former is likely to be more efficient in terms of property rights and public choice analyses since, unlike the competitive public enterprise, there is a private capital market constraint on managerial behaviour.

In terms of Figure 1, our central hypothesis is that an organisation 'improves' its performance as its status is changed on a west to east spectrum, ranging from government department, through agencies such as trading funds and public corporations, to public joint stock companies, and ultimately owner-managed firms. The representation suggests that organisational changes which involve movements north to south or west to east are likely to produce performance improvements, with movements south to north or east to west leading to lower efficiency. The remainder of the paper is concerned with testing our central hypothesis about organisational

status and performance. Immediately, questions arise as to how enterprise performance is to be measured.

Measuring Performance

The obvious focus is on efficiency in both its allocative and technical forms. However, given the inevitable difficulties in obtaining data on marginal costs, the study focused on identifying changes in production efficiency or, more generally, how well an organisation uses its resources. This is also the main focus of the property rights and public choice literature.

Having chosen to study production efficiency, there is still the problem of what precisely to measure. An organisation might appear efficient in terms of, say, labour productivity but have low profitability or inefficient use of fixed or working capital. To help overcome this, efficiency was considered using a number of criteria, including financial measures commonly used by accountants in assessing business performance as well as some standard economic measures, such as partial and total factor productivity. One advantage of this approach is that it acts as a check on whether the results of studies of organisational status and performance vary according to the efficiency measure selected. For reasons of space, however, the results reported in this paper relate only to employment and labour productivity.

Testing hypotheses relating organisational status and performance is not without its problems. Allowance has to be made for what would have happened without the change; for the likelihood that a transfer of ownership will result in the pursuit of different objectives; for anticipation effects whereby performance might improve prior to a status change; and for the possibility of substantial lags in improved performance following the change. Indeed, the possibility of both anticipation and lag effects raises doubts about relying on the publicly-announced date of the status change. Finally, and ideally, a model is required which holds constant all other relevant variables, so isolating any contribution of status change to improved performance. For example, it has to be recognised that between 1979 and 1987, labour productivity in the UK rose

substantially so that the "successes of privatisation" need to be judged against the economy's general performance (Crafts 1988). In this paper the counter-factual is represented by general trends in the UK economy, and for public corporations where relevant.

Applied to employment, it is hypothesised that a west to east movement in Figure 1 will be associated with a shake-out of labour as organisational slack and over-manning are reduced and hence productivity is improved. This was tested initially using figures of the growth in labour productivity around the time of the status change. To assess the longer term effects, an organisational status variable was incorporated into a standard employment function which takes the general form:

$$L_t = C + b_i V_i + C_i X V_i + DVSC + U_t$$

where L is employment; C is a constant; V is a vector of variables, notably, output, a time-trend and a lagged dependent variable; X is a slope shift dummy variable for status change applied to V; DVSC is an intercept shift dummy variable for status change; u_t = stochastic error term; $b_i = (-r\lambda/\alpha)$, λ/α and $1 - \lambda$ where r is the trend growth of productivity; is the speed at which actual employment adjusts to its desired level ($0 < \lambda < 1$); α is the elasticity of output with respect to employment and the equation is in natural logarithms (Ball and St. Cyr, 1966; Hartley and Lynk, 1983; Killingsworth, 1970). Positive coefficients were predicted for output and the lagged dependent variable, whilst a negative relationship was expected for the time-trend. For the intercept dummy representing status change, a negative relationship was predicted for a west-east move and a positve relationship for an east-west move, as shown in Figure 1. The dummy was also used in its slope shift form to estimate any favourable performance effects of status change on output, productivity trends and on the speed of adjustment.

Various criticisms can be made of the employment model. It assumes cost-minimising behaviour subject to a Cobb-Douglas production function and a simple adjustment mechanism; that the capital stock and technology can be represented by a time-trend; and it is a single equation model. Nor in our case were data available for hours worked. Alternative formulations of labour demand equations have used a CES production function and have

included lagged hours worked, relative factor prices, real labour costs, peak productivity, and lagged output variables with equations allowing for structural breaks. Some alternative formulations were estimated, including real wage and lagged output variables (Peel and Walker and Treasury models, respectively: see Kilpatrick and Naisbitt 1984). However, our preference for the above standard employment function reflected three factors. First, resource constraints and the availability of data. Our task was to attempt various tests of the status change hypothesis and not to devote our limited resources to refining production functions. Second, when tested against alternative employment functions, the above model has performed more satisfactorily on statistical grounds (Kilpatrick and Naisbitt, 1984, p22). Third, dummy variables have previously been included successfully in a standard employment function to estimate for the effects of a shake-out of labour (Hartley and Lynk 1983).

The Organisations

Ten organisations were selected for our study. With the exception of British Airways (BA), each has been subject to at least one organizational change, and the group embraces the main status movements shown in Figure 1. BA is included as an example of an anticipated status change. The organisations selected were ones for which there were reasonably comprehensive published accounts and reports covering a substantial period both before and after the status change so that the selection was not random. Nevertheless, there are no grounds to believe that they are unrepresentative. Some of the organisations selected, such as Rolls Royce (RR), have recently experienced a further change of status (privatisation), but such recent changes are not included in the study owing to insufficient data since the change. In addition to BA and RR, the organisations selected are the Post Office postal (POP) and telecommunication (POT) services (now British Telecom), the National Freight Corporation (later Consortium: NFC), The Royal Ordnance Factories (ROF), the Royal Mint (RM), Her Majesty's Stationery Office (HMSO), British Aerospace (BAe) and London Transport (LT).

The PO had been a government department since 1840 and took over the operation of all UK telecommunications (except in Kingston-upon-Hull) in

1912. The status change with which we are concerned is the transfer from government department to public corporation of the PO and more especially its two main businesses - postal services and telecommunications - in 1969. In postal services, the PO held a complete monopoly of normal mail services, but not parcels and courier deliveries, and of telecommunications in the UK (excluding Kingston-upon-Hull) until the 1980s.

The NFC was established on 1 January 1971 as a public corporation to take over the public sector freight undertakings of the Transport Holding Company (notably British Road Transport Services and Pickfords) and of British Rail (National Carriers and Freightliner). The result was Britain's largest transport, distribution, storage and travel business. However, unlike the Post Office, from the outset it faced competition from a large number of smaller and more specialised transport firms as well as competition from rail and air. Throughout the period studied, the NFC controlled under 10 per cent of the UK road haulage market. In 1982 the assets of the Corporation were transferred to the private sector in a management and staff buy-out, assisted by bank finance. Over 10,000 employees and their families bought shares and today around 65 per cent of the workers own shares in the company. This privatisation is generally considered to have been a marked success with a substantial appreciation in the value of shares since privatisation. The NFC chairman, Sir Peter Thompson, refers to worker ownership as 'magic ingredient X' (Veljanovski, 1987, p139). However, the privatisation occurred towards the end of the early 1980s recession and the extent to which performance has improved, if at all, when studied over a longer period with adjustments for other influences remains to be demonstrated. Also, until 1988 the shares in NFC were not publicly quoted so there was no takeover threat to spur management; and in the property rights literature worker ownership means diffused ownership rights leading to less efficiency.

The ROF were first established during the period 1937-43 and on 1 July 1974 became the first British trading fund. The ROF manufactures small arms, ammunition and explosives, weapons and fighting vehicles, with a domestic monopoly in some of its products. As well as supplying the UK armed services, the ROF also supplies the armed forces of Commonwealth and other 'friendly' governments. After 1974, although personnel remained

civil servants and subject to the pay and conditions of the civil service, the ROF was no longer financed by annual votes and appropriations. Instead, financial objectives were established under the Trading Funds Act 1973 and specified by Treasury minute covering, in particular, borrowing powers, depreciation policy and return on assets. While remaining under the control of the Secretary of State for Defence, the ROF was required to adopt commercial practices and 'to pay for all supplies of goods and services received and to charge for all supplies both to government departments and other customers at home and abroad' (Appropriation Accounts H of C (136) 1976/77, vol.1, class 1-111). In 1984 the ROF was incorporated as a holding company with a number of divisions, which were privatised by sale to BAe in 1987 (with Vickers plc purchasing the tank business of ROF Leeds in 1986). However, this study concentrates on the transfer of the ROF from direct government department control to a trading fund in 1974.

Our research project considered two other organisations which were transferred from a government department to a trading fund, namely, the RM, with a history of responsibility for minting the coin of the realm and commemorative and other medals; and HMSO, which is the government's publisher and distributor of official reports and similar documents. The RM became a trading fund in 1975 and the HMSO in 1980. In addition, BA is taken as an example of anticipated change. BA was established in 1973 in a merger of two state-owned airlines. The decision to denationalise was announced in 1980, but action was postponed until 1987 due to adverse trading conditions and law suits in the USA relating to the collapse of Laker Airways: hence BA has substantial experience of anticipating a status change and was included in the study as an example of possible anticipation effects.

In February 1971 RR changed its status from a privately-owned to a publicly-owned limited company when the then Conservative Government purchased the gas turbine (aero and marine engine) and nuclear propulsion businesses of the company, together with the name RR, from the receiver. The company had experienced serious financial difficulties following severe cost overruns on its RB 211 engine development programme. RR's status change, therefore, contrasts with the other organisations because it was

unplanned and coincided with a major crisis. The company which is a domestic monopoly remained in the public sector until it was privatised in May 1987 by a public flotation of shares. This study considers the effect of the movement into the public sector in 1971 (an east to west movement in Figure 1).

BAe was established by the 1974-79 Labour Government under the Aircraft and Shipbuilding Industries Act 1977, which brought together into a single public corporation a number of private sector companies, namely, the British Aircraft Corporation (Holdings) Ltd., Hawker Siddeley Ltd. (Aviation and Dynamics) and Scottish Aviation Ltd. BAe which has a domestic monopoly is involved in the supply of military aircraft, guided weapons and electronics, civil aircraft, space and communications and later munitions with the acquisition of the ROF in 1987. In opposition in 1977, the Conservative Party pledged itself to denationalise BAe at the earliest opportunity. Returned to power in 1979 the pledge was honoured and the privatisation process was begun with the sale of 51.6 per cent of the shares in British Aerospace plc in February 1981 and the remainder of the ordinary shares in May 1985. The government retains a 'golden share' to prevent a foreign takeover of this key defence supplier and from a property rights perspective this existence of a barrier to a takeover implies a loss of incentive for management to be efficient. Nevertheless, our central hypothesis suggests that the status change in 1977 should have reduced efficiency and the change in 1981 should have increased efficiency. Both changes in status are considered. Although privatisation was not completed until 1985, at the time of the sale of the first tranche of shares the government pledged that it would no longer interfere in the running of the company and therefore this date can be taken as the date of privatisation.

The final organisation studied is LT. Transport in the capital was first placed under the control of a public corporation in 1933 to produce a planned and co-ordinated public transport system. LT has since gone through a number of reorganisations while remaining a public corporation. Between 1948 and 1962 the London Transport Executive was an operating subsidiary of the British Transport Commission, which also was responsible for British Railways. With the demise of the BTC, from 1 January 1963 to the end of 1969 the London Transport Board was directly answerable to the

Department of Transport and operated like other public corporations. However, between 1970 and 1984, as the London Transport Executive, London Transport became answerable to a local authority, the Greater London Council (GLC). During this period there seems to have been considerably more direct political interference in the organisation's operations than had existed earlier or since. In particular, pricing policy was often determined by political and social rather than economic or commercial criteria. In 1984, as London Regional Transport, the corporation became once again answerable to central government. Although in strict legal terms London Transport remained a public corporation throughout, in terms of our schema (Figure 1) the transfer to the GLC is treated as a movement from a public corporation to a government department status, while the change in 1984 is treated as a movement back from a government department to a public corporation. Both movements are studied.

Figure 2 summarises the status changes for each of the ten organisations using the model developed in Section 2. Given their dependence on government, for Rolls Royce, and BAe the dotted line between the hybrid and joint stock company categories is intended to reflect the ambiguity about theirstatus before being taken into public ownership in 1971. For BAe and LT two status changes are shown. In all cases, any significant changes in competition in the product market which broadly coincided with the status change are reflected in a movement on the north-south axis. Only in the cases of BAe on nationalisation, when competitive producers were merged, and LT in the mid-1980s when bus routes became contestable, is there evidence of such movement. In the other cases there does not appear to have been an important change in product market competition contemporaneous with the status change. The fact that there was such little change in the competition variable makes it easier to identify the impact of organisational status. Some of the major characteristics of the organisations are shown in Table 1.

Figure 2 and Table 1 Here

Empirical Results

The empirical results are reported at three levels. First, basic labour productivity growth figures are discussed. Second, these results are considered in the light of employment function regressions. Finally, the productivity trends are compared with changes in national productivity.

(a) Labour productivity growth

Table 2 presents the results for the mean growth in labour productivity for the four years before and after the status change. Where an organisation went through two status changes in the period considered, two sets of results are presented. Four year periods were selected as a reasonable compromise between providing figures for a long period, which could reflect factors wholly unrelated to the status change, and too short a period which could relate to one or two unrepresentative years. Four year periods also reflect changes in productivity which relate to the status change but which precede the change - anticipatory effects - or which take sometime to take effect - lagged effects. Where the four year results, however, are biased by the inclusion of an unrepresentative productivity figure a different average is computed and shown in the table in parenthesis.

Table 2 Here

In the cases of both the Post Office postal and telecommunications businesses the movement from a government department to a public corporation status appears to have led to the rise in labour productivity which our model of status change predicted. In telecommunications the growth of productivity more than doubled in the early 1970s. In the postal business the result is less impressive with the slow fall in productivity recorded in the second half of the 1960s replaced by a modest growth in productivity in the early 1970s. The postal business, however, suffered a severe strike in 1971 related to the government's prices and incomes policy, which undermined productivity in that year. Leaving out that year,

average productivity growth after the status change was a more healthy 5.26%. In both cases productivity was measured as turnover deflated by the Post Office's own price series for postal and telecommunications, respectively.

For LT three sets of figures are reported representing different measures of output. LT(1) is output measured by passenger miles; LT(2) turnover deflated by a price series derived from LT's reported revenue per mile; and LRT(3) is turnover plus local and central government price compensation payments deflated by the non-food RPI. Under Greater London Council control prices were held down to encourage the use of public transport in London and LT was compensated from taxation.

The results using passenger miles suggest a slightly slower productivity growth after LT became accountable to the GLC, as our model predicts. This is not supported, however, by the other two output measures. Allowing for price compensation payments, productivity appears to have risen slightly after 1970; while based upon the revenue per mile price series there was a much sharper productivity improvement. These inconsistent results suggest the need for caution in deciding upon the effect of the first status change. The results for the second status change, however, are less ambiguous with productivity leaping using the LT(1) and LT(2) series when LT ceased to be supervised by the GLC and achieved greater managerial autonomy. This is especially so if productivity before the second status change is estimated leaving out 1983, which was a particularly good year and may be the consequence of an anticipatory effect. These results are shown in parentheses. Only when compensation payments are included (LT(3)) does productivity appear not to have improved; but again the rise in productivity growth is confirmed (9.31% p.a.) if 1986-88 is taken as the post-status period. These results are supported by a closer study of the underlying figures. Between the period 1971 and 1982 productivity growth was actually negative in 9 of the years using passenger miles and in 8 of the years using deflated turnover as the output measure. Since 1983 both series reveal that productivity growth has been in double figures.

Turning to the ROF, our model predicts that the movement from direct departmental control to trading fund status within government should have led to a rise in productivity. However, measures based upon deflating output using the ROF's SIC group price deflator (mechanical engineering) ROF(1)) and as a cross-check by the non-food RPI (ROF(2)), both suggest a marked fall in the growth of labour productivity. Initial results for Rolls Royce also were contrary to our expectation. The takeover by the state in 1971 appears to have led to a significant rise in labour productivity growth after a very disappointing performance in the four years prior to the company's financial collapse. This might well be explained by the one-off 'shock' effect of financial collapse, which encouraged management to remove major inefficiencies including overmanning. To test for this, productivity growth was measured from 1975 to 1978 to see whether the improved performance continued under state ownership. The results are in parentheses. Using output measures relevant to the company's SIC group and as a cross-check for the non-food RPI, it is apparent that the growth in productivity recorded for the early 1970s did not continue. This conclusion supports the view that the Rolls Royce results in the early 1970s are the consequence of one-off effects of the financial collapse.

In the case of British Aerospace nationalisation was associated with a slowdown in productivity growth and privatisation with a marked recovery in performance, as predicted by our model. Again output was measured using both the relevant SIC group price series (BAe(1)) and the non-food RPI (BAe(2)). Study of the annual productivity figures reinforces the conclusion that there was a serious decline in performance following nationalisation. Taking aggregate output and employment for the companies which were brought together as British Aerospace on nationalisation, in only 1 out of the 4 years before 1977 was productivity growth negative. In contrast, in none of the years since privatisation in 1981 has productivity fallen.

In 2 out of the 4 years that BAe was in the state sector productivity was negative.

Our model is also supported by the results for the National Freight Consortium where output was measured using turnover deflated by the government's transport and distribution price series and the non-food RPI, again as a cross-check. In this case productivity growth was fast in the years before the status change, probably reflecting the need to be more efficient given a highly competitive product market (the NFC, although large, represented under 10% of the total UK freight market in our period). The company also appears to have suffered a deterioration in performance in the four years following privatisation. This result, however, occurs because of a significant jump in productivity in 1981 and a fall in productivity in the year of privatisation, 1981/82. Taking out these unrepresentative years and comparing productivity growth in 1977-80 and 1983-86, a large growth in productivity is recorded (the relevant figures are in parentheses in Table 2).

To assess the performance of British Airways in the 4 years before and after the announcement that the company was to be privatised in 1980, labour productivity was measured using available tonne kilometres as an output measure. Initially it appears that productivity growth declined whereas the promise (or threat) of privatisation might have been expected to lead to a managerial drive to raise efficiency. Once again, however, the basic results need to be heavily qualified because the early 1980s was an especially difficult period for airlines. The world recession led to a falloff in business and consequently intensified competition. As a result productivity in British Airways stagnated between 1980 and 1982 before management undertook major de-manning and productivity growth recovered. Average productivity growth rose to 8.16% per annum in the four years 1981 to 1984 and to 11.94% per annum taking the years 1983-86. In other words, it appears to have taken some time to rationalise the business following the trading difficulties in the late 1970s and early 1980s. The run up to privatisation did produce the expected efficiency gains though at least in part they reflected adjustment to the new trading conditions of the 1980s.

A similar time lag appears to have affected the HMSO on becoming a trading fund in 1980. There was a large fall in labour productivity in 1980/81 followed by a recovery. However, in the case of the HMSO productivity growth appears to have been stagnant or rising relatively

slowly depending upon the output price deflator used prior to the status change, so that even including 1980/81 in the post-status change figures, productivity rose markedly. Excluding this year, labour productivity rose by an even more impressive 15% per annum.

Finally, the Royal Mint which became a trading fund a little earlier, in 1975, seems also to have recorded a large rise in productivity, reversing a serious decline in the years 1972-75. Between 1976 and 1979 productivity grew by 8.75% per annum. In this case, however, the result is biased upwards by an especially strong leap in productivity in 1976. Leaving out this exceptional year productivity growth averaged 1.3% p.a., a more modest performance, but still a marked improvement on earlier years.

(b) Employment functions

In general the labour productivity results support our status change model outlined earlier. But they are open to three major objections: (i) mean growth figures may conceal trends in growth; for example, if the productivity growth rate was rising both before and after the status change, an improved performance would be attributed to the status change even though it had had no significant effect upon the trend; (ii) the choice of the four year periods is arbitrary and in particular results based on these periods might not be representative if a longer-view is taken (this is evident especially in the cases of Rolls Royce and National Freight as we have already observed); (iii) the averages may reflect changes in national productivity trends. For instance from 1974 to 1980 productivity growth in the whole of the UK economy and in UK manufacturing was very low, whereas in the 1980s productivity growth, especially in manufacturing, has been high.

To meet objections (i) and (ii) labour productivity is now assessed using employment equations as detailed earlier in the paper. Objection (iii) is tackled in section (c) of the paper below.

Various employment functions were fitted using shift and slope dummies to represent the status change. The date of the status change was also altered by ± 2 years to reflect leads and lags in performance adjustment.

Ball and St. Cyr, Peel and Walker and Treasury formulations of the employment function were tried and equations were also fitted to test for illogical returns to scale (Kilpatrick and Naisbitt 1984). In general the Ball and St. Cyr formulation provided the most satisfactory results in terms of t statistics and adjusted R^2. In most cases a real wage variable, introduced as an explanatory variable in the Peel and Walker employment function was not significant. The Treasury equation also was generally unsatisfactory; though this probably results from the lagged output variable and the use of annualised data. The Treasury model is designed for use with quarterly data and it is not too surprising that output often had no statistically significant effect on employment twelve months later. The introduction of 'leads and lags' for the status change in general did not affect the overall results; where it did this is noted.

Table 3 provides employment equations for each of the ten organisations studied. In all cases the most significant equations only are reported. For most organisations interaction terms (slope dummies) were fitted. Where they helped to reveal the impact of the status change they are included; elsewhere the effect of the status change is reflected in a shift dummy. In most cases the long-run employment elasticity (e) is less than unity (and in a few cases more than unity) in the Ball and St. Cyr functions, which implies that the returns to labour parameter in the underlying production function is greater than unity. One possible explanation is labour hoarding (cf. Morgan, 1979, p7) which we might expect especially in publicly-owned organisations lacking a firm budget constraint and in the 1960s and early 1970s when there were labour shortages in the UK. An alternative explanation lies in the underlying production function, which takes the Cobb-Douglas form. This may be inapplicable for a number of our organisations - though the other employment functions tried usually provided inferior fits.

Also we would expect the long-run elasticity (e) to be greater than the short-run elasticity (the coefficient on output) because it takes time to shed labour. This was borne out in most though not all cases. In some cases the coefficient on the lagged dependent variable was insignificant. Again this result may relate to weaknesses in the underlying model or to the use of annualised rather than, say, quarterly data (only annualised

data are available in published accounts and reports).

Table 3 Here

Turning to specific results, for the Post Office's postal services there is no support for the view that productivity improved after the status change in 1969. The shift dummy is negative but statistically insignificant (PO postal (1)). Omitting the strike year 1971 improved the coefficient on the dummy slightly but it was still not significant at the 10% level or better (equation 2). In both cases the expected relationship with output exists but there is evidence of less efficiency over time (the coefficient on t is significant but positive). This bears out a suggestion in other studies (e.g. Pryke, 1981) that the postal service was inefficient in its use of new technology introduced in this period, notably mechanical sorting of mail. Reference to the figures on labour productivity changes in the postal service confirms that in 10 of the 22 years between 1960 and 1981 productivity declined, sometimes sharply.

It did not prove straight forward to fit any of our employment functions to the Post Office telecommunications data. The equation in Table 3 is of the Ball and St. Cyr form and only the lagged dependent variable is statistically significant. Particularly worrying are the insignificant coefficient on output and on time in an industry subject to major technical advances. Omitting the lagged dependent variable did produce the following interesting result, however, and without a serious loss in the overall significance of the equation:

$$\text{PO telecom. Emp.} = \underset{(46.03)}{10.76C} + \underset{(3.69)}{0.74\log Q} - \underset{(2.76)}{0.05t} - \underset{(3.12)}{0.12D} \qquad \bar{R}^2=0.78$$

t values in parenthesis

with all coefficients significant at the 1% level except t which is significant at the 5% level. This equation confirms that employment efficiency did improve after the status change. However, the result must be treated with caution since removing lagged employment involves a departure from the employment model, where employment adjusts to its

optimal level with a lag. Perhaps removal of the lagged dependent variable can be justified where there are inflexible labour contracts which prevent the operation of the expected adjustment process. Telecommunications in the UK is highly unionised. The equation has similarities to the Treasury employment equation, though lagged output was not significant and is therefore not reported.

The results in equations 1 to 3 for London Regional Transport bear out improved performance related to the second status change, especially when the dummy is applied from 1983 as in equation LT(1) (the year prior to the status change). This is so whether output is measured using deflated turnover or passenger miles; although only at the 10% level. In all cases the coefficient on output is negative implying considerable inefficiency in the use of labour, while the time variable is insignificant suggesting poor use of capital. If this explanatory variable is omitted then the improvement in performance from 1983 is more evident:

$$\underset{}{\text{LT Emp.}} = \underset{(1.23)}{5.15C} - \underset{(1.71)}{0.20\log Q} + \underset{(2.28)}{0.69\text{Log}N_{t-1}} + \underset{(0.57)}{0.02D1} - \underset{(2.93)}{0.06D2} \qquad \bar{R}^2=0.80$$

There is, however, no evidence that the first status change in any formulations of the employment function had an effect on employment.

Consider equation LT(4), which is based on turnover plus price compensation payments. In this equation output now has the expected sign though the large coefficient on lagged employment implies a negative long run employment elasticity; which could suggest high inefficiency or problems with the underlying employment model. Also, now neither status change appears to have had a significant effect on employment; though this result is especially sensitive to the year chosen to test for the effects of the status change.

Turning to the ROF two output measures are used and the resulting equations reported. Both equations produce good fits and the expected signs for output, the lagged dependent variable and time over the period studied, 1968-1984. But the dummy variable, contrary to expectation, is

positive and significant thus confirming the result from the productivity figures reported earlier. Apparently transfer from control by a government department to trading fund status in 1975 was associated with reduced efficiency in the use of labour. The finding is similar for Rolls Royce where a rise in employment efficiency on transfer into public ownership is confirmed, notwithstanding the earlier comments about the deterioration of performance in the mid-1970s.

For BAe the standard employment function with and without interaction terms provided a poor fit and is not reported. Instead an equation based upon the Treasury employment function provided more useful results though the lagged output variable was insignificant and hence is omitted. The lack of significance probably results from the use of annualised data, as mentioned earlier. Two equations are presented in Table 3 reflecting different price deflators for output. The dummy variables relate to the two periods of private ownership and compare with the period of nationalisation. Although the shift dummies are positive, the interaction terms on output suggest a marked improvement in employment efficiency especially during the second period of private ownership. In other words, the coefficient on output was substantially higher during nationalisation implying a greater increase in employment to produce any given increase in output: a result which supports the findings for labour productivity reported earlier.

Turning to National Freight three equations are presented in Table 3; two with shift dummies only based upon different price deflators and a third including an interaction term on output. Equations with only a shift dummy suggest, surprisingly, that there was no significant increase in employment efficiency at the 10% level or better (though the sign is negative as expected). The coefficient on lagged employment is also insignificant suggesting that employment fully adjusts to its optimum within 12 months; though this is not so surprising given the competitive environment in which the NFC operates. The inclusion of an interaction term on output, however, reveals that prior to the status change the output coefficient was insignificant but became significant following privatisation. In addition, the shift dummy is now significantly negative

suggesting a large increase in employment efficiency following the status change.

British Airways has been included in our sample of organisations undergoing relevant status changes because the decision to privatise BA was announced in 1980. Subsequently privatisation was postponed until 1987 for reasons outlined earlier. Three equations are reported. Equations 1 and 3 measure output using available tonne kilometres. Equation 2 by contrast is turnover deflated by the non-food RPI. In equations 1 and 2 the dummy is applied to 1980, in equation 3 to 1982 to reflect the lag in performance improvement noted earlier. Equations 1 and 2 provide the expected signs on output, the lagged dependent variable and time but suggest that the status change had an insignificant effect on employment at the 10% level or better (two-tail test). Lagging the dummy variable (equation 3) provides evidence of improved performance at the 10% level.

In the case of HMSO, a poor fit was achieved when the standard employment equation was applied to the data and the date of the status change was taken as 1980 (equation 1). Other employment functions were tried but also produced unsatisfactory results. Adopting a lagged dummy, however, proved more rewarding. Equation 2 shows the results of taking the status change as 1982. The equation provides a good fit and the status change dummy is negative and significant at the 1% level.

Finally, in the case of the Royal Mint the Ball and St. Cyr employment function provided a poor fit. Again this might be explained in terms of hoarding labour to meet sudden changes in demand. The output of the Royal Mint fluctuates, largely depending upon the need for more domestic currency. The Peel and Walker formulations were more satisfactory and are reported in equations 1 and 2. There was evidence of multicollinearity between especially output and the lagged dependent variable. Dropping the latter improved the significance of the coefficient on output and the coefficient on the shift dummy with little loss in the overall fit of the equation. The results suggest that the movement to trading fund status led to an improvement in efficiency as reflected in the shift dummy, though this was in part offset by an increase in the coefficient on output.

(c) Controlling for 'other factors'

Time series analysis of the type undertaken here is subject to error arising from changes in 'other factors'. Productivity may have risen or fallen not due to the status change but due to some exogeneous factor or factors, such as changes in national productivity growth. In an attempt to reflect such exogeneous factors, Table 4 presents the productivity figures in Table 2 as a ratio of productivity growth in the whole economy, in UK public corporations and in UK manufacturing industry (where relevant) in the four years before and after status change or other periods as indicated. In interpreting the results we are looking for evidence that performance improved or deteriorated after the status change. But in addition a ratio of unity suggests that productivity growth in the organisation matched exactly the growth in the relevant UK index. A ratio of less than unity implies an inferior performance and greater than unity a superior result.

In the cases of the Post office telecommunications business, the HMSO and the Royal Mint productivity performance improved in relation to UK productivity and public corporation productivity growth following the change in status. For the HMSO and the Royal Mint involved in manufacturing, a comparison with UK manufacturing productivity growth also supports the view that performance improved. The performance of the Post Office postal business shows a particularly strong improvement when the 1971 strike year is excluded. Turning to the Royal Ordnance Factories and Rolls Royce, the earlier productivity and employment function results are supported with clear evidence of a decline in performance and an improvement of performance, respectively (though in the case of Rolls Royce this improved performance was reversed in the mid-1970s) contrary to our central hypothesis.

For those organisations with two status changes, London Transport's productivity growth compared with the whole economy and the average for public corporations appears to have improved marginally when the organisation became accountable to the GLC, contrary to our expectation. However, the improvement did not last. Through the 1970s there is evidence of a major loss of efficiency especially in the late 1970s and early 1980s.

In accordance with our central hypothesis the second status change led to a marked improvement in labour productivity, even when compared with the significant productivity growth in the rest of the economy and in public corporations since 1982. For British Aerospace the results are even more clear cut, with comparative productivity growth dropping substantially during the period of nationalisation and recovering after privatisation.

Turning to the National Freight Consortium comparative productivity growth improved between 1983 and 1986, supporting the view that privatisation raised efficiency. But comparative efficiency also rose and at a faster rate between 1978 and 1981, implying that there was considerable scope for efficiency gains and that these could be achieved under public ownership. The NFC comparisons are particularly sensitive to the periods chosen. In the case of British Airways, which remained in the public sector throughout the period studied, after a good comparative productivity performance in the late 1970s, performance deteriorated. It recovered especially from 1983 when overmanning was tackled, again suggesting that the improvement in performance following the announcement of privatisation in 1980 was delayed.

Conclusions

Three measures of employment efficiency have been used to capture the short-term effect of a change in organisational status, longer-term effects and to reflect changes in employment performance at the national level. In all cases, except the Post Office postal business, the results based upon the three measures were consistent. In the case of the postal service, the employment function result reflects a deterioration in performance from the mid-1970s. The results are summarised in Table 5.

Table 5 Here

In general, our central hypothesis that changes in status from west to east in Figure 1 lead to improvements in employment efficiency is supported. The only exceptions were the ROF, Rolls Royce and one of the changes for LT. The Rolls Royce result is probably explained by the 'shock

effect' of bankruptcy leading to necessary reorganisation rather than by any beneficial effects of public ownership. The ROF'S apparent failure to produce the expected gains in employment efficiency may be interpreted as supporting the view that 'short' movements on the west to east spectrum are less likely to lead to marked efficiency gains than 'long' moves. This has obvious implications for public policy. At the same time, the ROF results might also reflect the lack of any change in its position as a defence contractor operating in a protected and regulated market. With LT, the efficiency improvements were contrrary to expectations but they were not sustained.

Employment efficiency is, of course, but one measure of production efficiency. Further empirical work is being undertaken which tests our central hypothesis using financial ratios, total factor productivity and various indicators of changes in the internal organisation of enterprises (Dunsire et al 1988).

Table 1 The Organisations

	Organisation	Status Change	Date of Change	Time-period of study
1.	PO Postal	Govt. dept. to Public corp.	1969	1959-81
2.	PO Telecommun-ications	Govt. dept. to Public corp.	1969	1959-81
3.	NFC	Public corp. to employee buy-out	1982	1970-86
4.	ROF	Govt. dept. to trading fund	1974	1968-84
5.	RM	Govt. dept. to trading fund	1975	1965-86
6.	HMSO	Govt. dept. to trading fund	1980	1976-88
7.	LT	a) Public corp. to Govt. dept. b) Govt. dept. to Public corp.	a) 1970 b) 1984	1963-87
8.	BAe	a) Private to Public b) Denationalised	a) 1977 b) 1981	1970-86
9.	RR	Private to Publicly owned company	1971	1960-81
10.	BA	Anticipation offer of privatisation	1980	1973-86

Table 2 Average Annual Growth in Labour Productivity

	4 years before status change 1	4 years after status change 1	4 years before status change 2	4 years after status change 2
PO postal	-1.12	1.33 (5.62)		
PO telecom	5.01	11.34		
LT(1)	2.43	2.08	3.25 (-4.06)	15.92
LT(2)	0.04	3.57	-0.31 (-3.72)	19.83
LT(3)	4.13	5.56	5.65	5.16 (9.31)
ROF(1)	9.41	3.47		
ROF(2)	13.55	4.40		
RR(1)	-0.46	16.52 (-1.39)		
RR(2)	-0.30	13.55 (-3.65)		
BAe(1)	6.26	2.43	2.43	7.76
BAe(2)	9.02	1.60	1.60	6.85
NFC(1)	5.09 (0.51)	3.99 (8.17)		
NFC(2)	6.09 (2.11)	2.41 (6.49)		
BA	7.49	4.81 (8.19) (11.61)		
HMSO(1)	-0.46	4.91 (15.19)		
HMSO(2)	4.75	11.88 (15.33)		
RM	-5.56	8.75 (1.30)		

Notes

Organisations: PO=Post Office, LT=London Transport (later London Regional Transport), ROF=Royal Ordnance Factories, RR=Rolls Royce, BAe=British Aerospace, NFC=National Freight Corporation (later Consortium), BA=British Airways, HMSO=Her Majesty's Stationery Office, RM=Royal Mint.

Output measure used as basis of productivity figures: PO postal and PO telecom - turnover deflated by the Post Office's postal and telecom price series respectively: LT(1) passenger miles, LT(2) turnover deflated by price series derived from information on revenue per mile in accounts, LT(3) turnover plus central and local government price compensation payments deflated by the non-food retail price index; ROF(1) output deflated by the ROF's SIC group price deflator, prices mechanical

engineering; ROF(2) output deflated by the non-food retail price index; RR(1) output deflated by RR's SIC group price deflator, prices mechanical engineering; RR(2) output deflated by the non-food retail price index; BAe(1) output deflated by BAe's SIC group price deflator, prices mechanical engineering; BAe(2) output deflated by the non-food retail price index; NFC(1) turnover deflated by NFC's SIC group price deflator, prices transport and distribution; NFC(2) turnover deflated by the non-food retail price index; BA available tonne kilometres; HMSO(1) output deflated by non-food RPI, HMSO(2) output deflated by prices printing and publishing, RM number of coins minted.

Table 3 Employment Functions

Organisation	C	LogQ	$\log N_{t-1}$	Time	D1	D2	X1	X2	λ	e	$\bar{R}^2$
PO postal(1)	7.04**	+ 0.10*	+ 0.35‡	+ 0.01*	- 0.01				0.65	0.15	0.72
	(3.50)	(2.15)	(1.97)	(2.23)	(0.55)						
PO postal(2)	7.19**	+ 0.11*	+ 0.33‡	+ 0.01*	- 0.01				0.67	0.16	0.73
	(3.47)	(2.19)	(1.81)	(2.26)	(0.71)						
PO telecom	3.25‡	+ 0.21	+ 0.71**	- 0.01	- 0.31				0.29	0	0.90
	(2.08)	(1.23)	(4.91)	(1.12)	(1.06)						
LT(1)	6.74	- 0.25‡	+ 0.60‡	+ 0.01	+ 0.01	- 0.05Z			0.40	- 0.63	0.81
	(1.47)	(1.91)	(1.86)	(0.88)	(0.27)	(1.62)					
LT(2)	4.30	- 0.31‡	+ 0.80*	- 0.01	- 0.01	- 0.04Z			0.20	- 1.55	0.91
	(1.00)	(1.99)	(2.58)	(0.70)	(0.38)	(1.35)					
LT(3)	-2.04	- 0.38**	+ 1.38**	- 0.01	- 0.01	- 0.04‡			- 0.38	1.00	0.96
	(1.72)	(4.33)	(13.59)	(0.87)	(0.50)	(1.86)					
LT(4)	-2.07	+ 0.26*	+ 1.11**	- 0.01*	+ 0.01	+ 0.01			- 0.11	- 2.36	0.92
	(1.26)	(2.53)	(6.92)	(2.31)	(0.24)	(0.20)					
ROF(1)	2.38*	+ 0.20**	+ 0.79**	- 0.02**	+ 0.11**				0.21	0.95	0.88
	(2.34)	(3.20)	(8.41)	(5.12)	(4.26)						
ROF(2)	2.23‡	+ 0.15*	+ 0.80**	- 0.02**	+ 0.09*				0.20	0.75	0.86
	(2.10)	(2.69)	(7.85)	(4.53)	(2.66)						
RR(1)	4.65**	+ 0.12*	+ 0.51**	+ 0.01	- 0.13**				0.49	0.24	0.92
	(3.23)	(2.20)	(4.20)	(0.03)	(4.32)						
RR(2)	3.99*	+ 0.13‡	+ 0.57**	+ 0.01	- 0.13**				0.43	0.30	0.92
	(2.53)	(1.94)	(4.53)	(0.06)	(4.27)						
BAe(1)	8.30**	+ 0.54*		- 0.01‡	+ 2.23	+ 3.67*	- 0.31	- 0.50*			0.52
	(6.25)	(2.79)		(2.19)	(1.28)	(2.39)	(1.26)	(2.34)			
BAe(2)	6.65**	+ 0.80*		- 0.02*	+ 4.73‡	+ 5.19*	- 0.66‡	- 0.71*			0.53
	(3.36)	(2.79)		(2.50)	(2.16)	(2.36)	(2.15)	(2.32)			
NFC(1)	7.10*	+ 0.48**	+ 0.27	- 0.02*	- 0.08				1.00	0.48	0.98
	(2.68)	(4.33)	(1.52)	(2.17)	(1.36)						
NFC(2)	6.74**	+ 0.70**	+ 0.16	- 0.03**	- 0.06				1.00	0.70	0.98
	(3.18)	(6.30)	(0.94)	(3.04)	(1.17)						
NFC(3)	21.48**	- 0.25	- 0.26	- 0.09**	- 7.46**		+ 1.46**		1.00	0 (a)	0.99
	(4.41)	(1.03)	(1.22)	(4.12)	(3.27)		(3.24)			1.46(b)	

BA(1)	2.95*	+ 0.60**	+ 0.47**	- 0.03*	- 0.07^{x}				0.53	1.13	0.96
	(2.60)	(3.35)	(4.04)	(2.92)	(1.64)						
BA(2)	1.64	+ 0.87*	+ 0.54**	- 0.04*	+ 0.09				0.46	1.89	0.90
	(0.72)	(2.34)	(3.27)	(2.36)	(0.97)						
BA(3)	1.94**	+ 0.67**	+ 0.49**	- 0.03*	- 0.08$^{\#}$				0.51	1.30	0.97
	(1.68)	(4.05)	(4.70)	(3.14)	(2.04)						
HMSO(1)	4.09	+ 0.03	+ 0.68**	- 0.02	- 0.08				0.32	0	0.97
	(1.16)	(0.12)	(3.69)	(1.05)	(0.70)						
HMSO(2)	6.22*	+ 0.20$^{\#}$	+ 0.36$^{\#}$	- 0.02^{x}	- 0.19**						0.99
	(2.29)	(2.08)	(2.16)	(1.59)	(3.95)						
RM(1)	-0.38	+ 0.13^{x}	+ 0.44$^{\#}$	+ 0.01	- 2.23^{x}		- 0.55**		0.56	0.23	0.74
	(0.15)	(1.50)	(2.03)	(1.01)	(1.63)		(2.96)				
RM(2)	3.44^{x}	+ 0.21*		+ 0.01	- 3.25*		- 0.41*	+ 0.43* -		-	0.69
	(1.82)	(2.42)		(0.24)	(2.32)		(2.17)	(2.30)			

Notes

$\bar{R}^2$ is adjusted for degree of freedom; λ speed of adjustment (1-coefficient on lagged employment); e = long-run employment elasticity (coefficient on output divided by λ).

Although our central hypothesis suggests a direction of change in performance, we have applied 2 tail tests on the grounds that performance may have changed in any direction. Thus except where indicated by x, which indicates significant at 10% level 1 tail test only, in all cases ** indicates significant at the 1% level. * at the 5% level, # at the 10% level using 2 tail tests. Figures in brackets are t-ratios

X1=D1xlogQ except for RM where = real wages; X2=D2xlogQ
a=pre-status change; b= post-status change

All equations reported were considered for first order serial correlation using the Cochrane-Orcutt iterative technique and the standard errors were found to be consistent in the presence of lagged dependent variables.

Output measures:
PO postal (1) and (2) and telecom=output deflated by the Post Office's own relevant price deflators;
LT(1)=passenger miles, (2)=turnover deflated by LT price deflator, (3)=turnover deflated by non-food RPI, (4)=turnover plus compensation payments deflated by non-food RPI.
ROF,RR and BAe (1)=output deflated by prices mechanical engineering; ROF,RR (2)=turnover deflated by non-food RPI;
NFC(1)(3)= turnover deflated by prices transport and distribution; NF(2)= turnover deflated by non-food RPI;
BA(1)(3)= available tonne kilometres,(2)=turnover deflated by non-food RPI;
HMSO(1)(2)=output deflated by prices printing and publishing.
RM(1)(2)=number of coins minted.

Table 4 Controlling for national productivity changes: comparative average productivity growth

Organisation	Productivity of Organisation/ avg.productivity economy	Productivity of Organisation/ avg.productivity public corporations	Productivity of Organisation/ avg.productivity UK manufacturing
PO postal			
1966-69	-0.39	-0.16	n/a
1970-73	-0.48	-0.81	
1970,72,73	1.92	3.23	
PO telecom			
1966-69	1.76	0.71	n/a
1970-73	4.06	6.87	
LT			
1967-70	0.81	0.39	n/a
1971-74	1.17	0.70	
1979-82	-3.00	-0.56	
1980-83	1.74	0.45	
1985-88	8.38	*	
ROF			
1971-74	5.29	3.75	2.48
1975-78	2.14	0.75	2.24
RR			
1969-70	-0.10	-0.05	-0.08
1971-74	7.61	5.40	3.57
1975-78	-2.24	-0.80	-2.34
BAe			
1973-76	8.03	1.11	2.57
1977-80	1.98	0.62	1.03
1981-84	2.82	1.19	1.28
NFC			
1977-80	1.72	0.53	n/a
1978-81	6.03	0.86	
1982-85	0.82	0.38	
1983-86	2.56	2.83	
BA			
1976-79	3.12	1.16	n/a
1980-83	2.56	0.66	
1981-84	2.97	1.25	
1983-86	4.70	5.24	
HMSO			
1977-80	-0.37	-0.12	-5.75
1981-84	1.79	0.75	0.81

RM			
1972-75	-7.72	-1.87	-2.16
1976-79	3.65	1.36	3.69
1977-79	0.56	0.29	0.94

Note

* Privatisation sales distorted productivity figures for this period

n/a not applicable, non-manufacturing business.

Sources:

Whole economy and UK manufacturing figures CSO-Datastream; public corporation figures own series based upon sales at constant prices.

Table 5 Summary of Results

Central hypothesis supported?

Measure	Labour productivity growth	employment function	comparative productivity growth
PO postal	Yes	No	Yes
PO telecom	Yes	limited support	Yes
LT(1st change)	mainly No	No	No
LT(2nd change)	Yes	limited support	Yes
ROF	No	No	No
RR*	No	No	No
BAe(1st change)	Yes	limited support	Yes
BAe(2nd change)	Yes	Yes	Yes
NFC	Yes	Yes	Yes
BA	Yes	Yes	Yes
HMSO	Yes	Yes	Yes
RM	Yes	Yes	Yes

Notes

* Comments on Rolls Royce relate to the years immediately after transfer into state ownership. The improved performance did not continue through the mid-1970s.

FIGURE 1

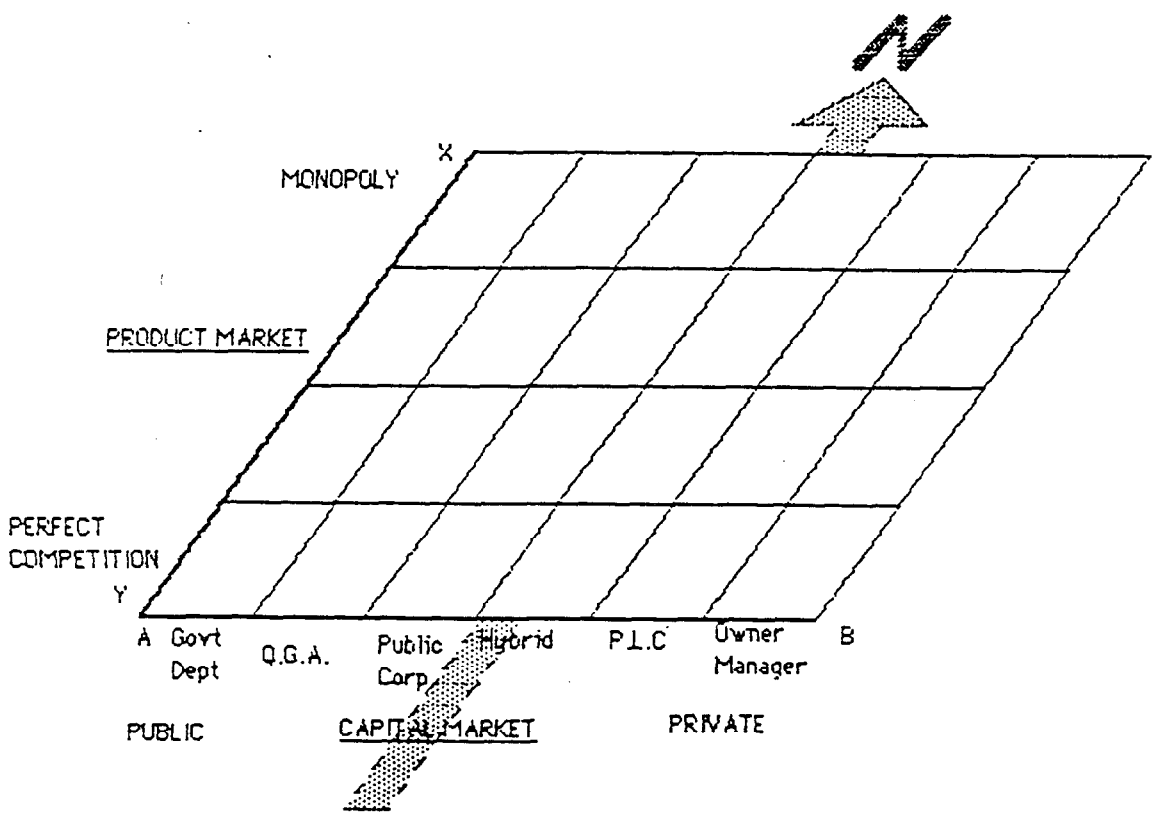
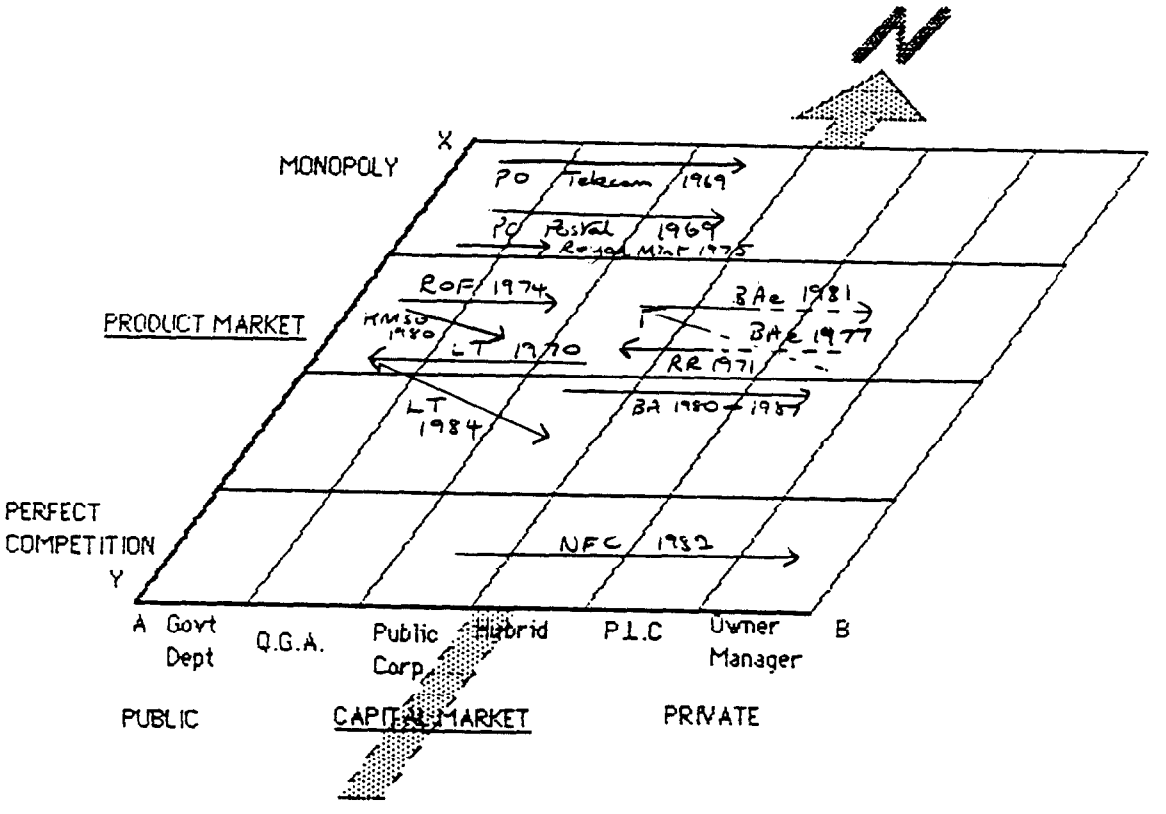

MONOPOLY
X
PRODUCT MARKET
PERFECT
COMPETITION
Y
A
Govt
Dept
Q.G.A.
Public
Corp
Hybrid
P.L.C
Owner
Manager
B
PUBLIC
CAPITAL MARKET
PRIVATE

FIGURE 2


MONOPOLY
X
PO Telecom 1969
PO Postal 1969
ROF 1974
HMSO 1980
LT 1970
BAe 1981
BAC 1977
RR 1971
PRODUCT MARKET
LT 1984
BA 1980 - 1987
PERFECT COMPETITION
Y
NFC 1982
A Govt Dept
Q.G.A.
Public Corp
Hybrid
P.L.C
Owner Manager
B
PUBLIC
CAPITAL MARKET
PRIVATE

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