CAPITAL FINANCING, THE PROFIT OBJECTIVE AND BUSINESS RISK AT A RECONSTRUCTED BRITISH RAIL

by

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Two Volumes

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This thesis has been composed by, and is the work of, the author alone.

Irvine Lapsley

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PREFACE

The nationalised industries are, and always have been, beset by controversy. British Rail is no exception to this. There are many reasons why the state corporation is such a contentious form of organisation. For example, the sheer scale of these industries and their consequent impact on consumers, suppliers and the economy, in general. However, this thesis takes up an issue at the very heart of all disputes concerning these industries - capital financing. The major policy options considered are those of equity capital or Public Dividend Capital. However, wider policy issues are raised by addressing this issue.

Thus the first of these, equity capital, entails the restoration of British Rail to private ownership. Such a radical change in the nature of British Rail would be consistent with an increasingly influential school of thought in the U.K. However, the other alternative assessed within this thesis also implies a radical change in the status of British Rail. Thus, while the second option retains British Rail in public ownership, it nevertheless entails the adoption of a public sector surrogate for private sector equity capital. Therefore, this suggests that British Rail might be more properly regarded as a 'commercial' rather than a 'social' corporation. The implications of these alternative forms of capital financing are discussed within the main body of this thesis.

The objective of this thesis is to provide information to policy-makers on such options. This emphasis on public policy regarding the capital financing (and, consequently, the nature) of British Rail had important implications for the conduct of this study. In particular, the need to focus on the policy-maker has required an inter-disciplinary approach. Thus, the author has drawn on the literature of accounting, finance and economics in his appraisal of
these policy options. The end result is a thesis which seeks to marry theoretical analyses with their potential application to the real world problem of financing the railways. This contribution is timely, as it is made when there is fresh speculation over another capital reconstruction of British Rail.
ACKNOWLEDGEMENTS

This thesis was completed by the author, on a part-time basis, as a member of staff of the Department of Accounting and Business Method at Edinburgh University. The preparation of a part-time thesis of this nature was made difficult by the circumstances of that department (typical of major teaching departments of accountancy in U.K. universities), which do not facilitate such research. Thus, there is no great tradition of research in accounting, which is a relatively young academic discipline. This negative factor is made worse by the teaching conditions in such departments. There is an increasing pressure of demand for courses taught by such departments. This is typically exacerbated by the shortage of teaching staff. Accountants tend to be very mobile in their careers with the result that teaching departments suffer instability and shortages in staffing positions, which erodes research time.

However, such unfavourable circumstances have been compensated for by the many excellent colleagues, at Edinburgh and elsewhere, whose experience and knowledge have benefited the preparation of this thesis. While the author must make the traditional academic disclaimer that any errors of omission or commission are entirely his own, he nevertheless gratefully acknowledges the benefits received from his colleagues. Professor Geoffrey Whittington (when he held the post of Professor of Accountancy and Finance at Edinburgh University) first suggested that British Rail was a state industry which offered numerous interesting possibilities for research. He also helped to supervise this project in its initial stages. Subsequently, W. Duncan Reekie, as principal supervisor, has been a most perceptive and constructive critic. Professor D.P. Tweedie has also been a helpful and positive supervisor, at all stages of the work. Professor T.A. Lee and colleagues within the Department of Accounting and Business Method have also assisted
by willingly attending presentations by the author at staff seminars and by offering comments on draft papers. The author is grateful to Professor J.R. Perrin, with whom he worked as a Research Fellow, engaged on S.S.R.C.-financed research in public sector finance and accounting at the Centre for Industrial Economic and Business Research at Warwick University from 1976 to 1978. Work on this thesis was suspended during that period. However, the research experience gained provided valuable insights into the financing of the modern state corporation.

Various parts of this thesis have been accepted for publication. Most of these have also benefited from the comments of colleagues at various conferences. A version of chapter 2, 'In Search of a Profitable Railway', is forthcoming in Managerial and Decision Economics. Chapter 3, 'The Role of Accounting Measures in the Financial Regulation of Nationalised Industries' was presented at one of the University of Glasgow's Accounting Research Workshops, in January, 1981. This has subsequently been accepted for publication and is forthcoming in the Archiv für öffentliche und freigemeinnützige Unternehmen, a German academic journal which is devoted to issues in public sector finance, accounting and economics. Early versions of chapter 5, 'The "Social Profit" Alternative', were presented at the Easter Meeting of the Northern Accounting Group at the University of Durham, 1980 and at the third annual congress of the European Association of Accountants at Vrije University, Amsterdam in 1980. A version of this chapter has been published in the Journal for Business Finance and Accounting (Winter 1981). Finally, chapter 6, on 'non-financial indicators' has benefited from exposure at the 1981 annual conference of the Association of University Teachers in Accounting which was held at Dundee University. A version of this chapter was also presented at the fourth annual congress of the European Association of Accountants, which was held at IESE, the University of Navarre, Barcelona in 1981.
The author also acknowledges his indebtedness to Grace Young, who has converted hand-written chapters into an immaculate manuscript. Last, but not least, the author wishes to acknowledge the contribution made to the completion of this thesis by his wife, Pamela. While words cannot adequately express his appreciation for that contribution, the author wishes to record his gratitude for her patience, encouragement and support.
ABSTRACT

The aim of this thesis is to evaluate potential changes in the capital financing of Britain's railways, with a view to assisting policy-makers. Its major emphasis is an examination of the possibilities of introducing risk capital. However, this also entails discussion of wider issues regarding the objectives, regulation and operation of the railways.

In the first instance, it addresses these issues by examining the characteristics of the major policy options, i.e. Public Dividend Capital or the introduction of equity capital. While these options have radically different implications for Britain's railways, they nevertheless have the same prerequisites before their introduction, namely the existence of a profitable enterprise, the appropriateness of the profit objective and an exposure to business risk.

Thus, in the absence of a profitable opportunity, neither form of risk capital would be forthcoming. In Part II of this thesis, the attainability of a profitable railway is therefore examined. This suggests a scheme of reconstruction which identifies the profitable segments of the railways.

Furthermore, it has to be demonstrated that, not only is profitability attainable, but that the pursuit of profit is an appropriate objective for the railways. This is considered by examining the importance of accounting measures in both the financial regulation of all state industries and in key aspects of U.K. railway
policy. This establishes that the profit objective has indeed operated as a crucial indicator in policy-making towards nationalised industries. It has also been of considerable importance at key events in the life of the railways. The continued importance of accounting measures in this role is also evaluated by assessing the principal alternatives to accounting measures. This is based on an examination of the railways as a 'social corporation' in which an evaluation is made of the potential for a 'social profit or loss' or a proxy for such a measure derived from nonfinancial indicators. This reveals that, not only is the concept of a 'social profit or loss' illusory, but that the usefulness of proxies based on nonfinancial indicators are best used as supplements to existing accounting measures.

Finally, an empirical assessment is made of the riskiness of the reconstructed, profitable railways envisaged in Part II of this thesis. This empirical data is predominantly qualitative, but includes an exploratory quantitative investigation. The qualitative assessment is based on a longitudinal examination of B.R.s exposure to business risk. This evidence points to the appropriateness of introducing risk capital at the reconstructed B.R. However, the results of the exploratory statistical investigation are inconclusive.
Chapter 1

RISK CAPITAL - PUBLIC DIVIDEND CAPITAL OR EQUITY?

The principal aim of this thesis is an examination of whether British Rail (B.R.) should receive some form of risk capital, whether Public Dividend Capital (P.D.C.) or equity. However, such an investigation necessarily embraces numerous other issues of concern to policy makers. This chapter sets out the competing claims regarding P.D.C. and equity. It also provides an overview of the detailed assessment (and wider issues involved in) the relevance of risk capital to B.R.

1. THE CASE FOR PUBLIC DIVIDEND CAPITAL

B.R. has pressed its claims for P.D.C., the public sector surrogate for equity capital, since it was first introduced in the mid-1960's. Initially, it made these claims for its total

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1 P.D.C. might be regarded as the public sector equivalent of ordinary share capital because it possesses two, similar, fundamental characteristics: (i) it is permanent capital, i.e. there is no contractual obligation on recipients to repay the principal advanced by a specified date and (ii) instead of fixed interest payments, dividends are paid on P.D.C., which are typically agreed jointly by the corporation and the Minister of State, with the approval of the Treasury.

2 This form of long term finance was first introduced in 1966, on an experimental basis, by the provision of £35 million of what was then called Exchequer Dividend Capital at B.O.A.C. This constituted circa 50 percent of B.O.A.C.'s capital structure at that time. Its introduction was a recognition of the failure of the Government's previous policy of dealing with business risk, viz., the setting of a financial objective, taking one year with another, to "act as a buffer" (see para 6, p.4), The Financial and Economic Obligations of the Nationalised Industries, Cmnd., 1337, 1961.
enterprise, but subsequently it has moderated its demands for P.D.C. to what it regards as the 'commercial segment' of its operations, notably its freight business. B.R. has based its claims for P.D.C., whether for the total enterprise or particular segments, on the grounds that (a) its long term finance is restricted to loan stock, which requires fixed interest payments and (b) such fixed interest obligations distort its reported financial results, because of B.R.'s exposure to business risk.

3 In its evidence to the Select Committee on Nationalised Industries (S.C.N.I.) investigating Ministerial Control, for example, the B.R. Board stated that "... there is a case for a substantial element of the debt to the Government of nationalised industries engaged in trading being treated as equity capital ...." (p.156, S.C.N.I., 'Ministerial Control of the Nationalised Industries, 1967-68, Vol II, Evidence). The Board reiterated this view that the railways were entitled to some measure of equity capital in its Annual Report of 1968, in the context of its capital reconstruction under the Transport Act of that year. The Board expressed "disappointment" that equity capital could not be substituted "for some or all" of the fixed interest debt to the Minister (para 1, p.5, Chapter II, B.R. Annual Report and Accounts, 1968). In its Annual Report of 1972, the Board continued to draw attention to what it considered to be its high capital gearing: ".... it should be noted that no part of the Board's capital structure consists of Public Dividend Capital...." (column 3, p.2, B.R.B. Annual Report and Accounts, 1972).

Thus, as regards (b), on the 'distortion' of its financial results, B.R. has argued that,

"... if (B.R.) were a commercial company and it had not been able to pay dividends, these unpaid dividends would not form part of the year's trading loss ..."\(^5\)

In the same vein, in commenting on its 1971 loss, the B.R. Board stated that,

"... a loss of £15.4 million was made after charging interest of £45.6 million .... this highlights the effect of the present method of financing the Board entirely by fixed interest capital ...."\(^6\)

The importance of such comments is dependent upon the validity of B.R.'s perception of its financial results as a key criterion by which it is judged by outsiders. Their significance is also contingent upon the degree of business risk to which B.R. claims it is exposed. B.R.'s assertions regarding the riskiness of its operations are primarily based on what it considers to be a high degree of variability of earnings caused by changes in the level of economic activity. In combination with long term finance which consists entirely of debt, this can make it necessary to raise further debt in a severe recession,

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simply to cover interest charges of the same amount.\(^7\)

However, regardless of B.R.'s demands and the claims cited in support of them, successive Governments have refused to provide B.R. with any P.D.C. This is despite its wider use in the public sector.\(^8\) The reason for this refusal can be traced to the Treasury's

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\(^7\) B.R. has repeatedly maintained that its financial success is a function of the state of economy. In its evidence to the S.C.N.I. on Ministerial Control of the Nationalised Industries, it asserted that its level of earnings "could vary substantially" according to the state of the economy (op.cit. p.156). In 1968, it supported its demands for risk capital by claiming that it was "a commercial enterprise with a turnover and profitability fluctuating with the level of economic activity in the country, which rendered capital financing on a wholly fixed interest basis inappropriate" (para 1, p.5, Chapter II, B.R.B. Annual Report and Accounts, 1968). B.R. has also made a somewhat oblique reference to having a high operating leverage which accentuated the variability of earnings. In the above-mentioned evidence to the S.C.N.I., it stated the "costs of supplying the service change slowly (sic) ...." - a reference to high operating costs which are fixed in the short term. Most recently, regarding its claims for risk capital in its freight business, B.R.'s case is on the same grounds as those of the 1960's: the effect of cyclical economic activity on its operations; the consequent impact of this variability of earnings and its 'high' interest costs on its profit and loss account on the downswing; the possible need to raise further loans to pay the interest due because of the lack of funds available to meet these immediate obligations (p.31, B.R., Transport Policy, op.cit.).

\(^8\) Since the 1960's the use of P.D.C. has become more common in nationalised industries (British Shipbuilders, British Airways, British Steel Corporation, Giro and the British Aerospace Corporation, for example) and other public corporations, such as the Royal Ordnance Factories. Furthermore, a recent S.C.N.I. report recommended that all major public transport operators (B.R., National Bus and British Airways) should have comparable financial structures (each of which should have a proportion of P.D.C.) on the grounds that differing financial obligations could distort the assessment of their financial performance (para 294, S.C.N.I., The Role of B.R. in Public Transport, Vol.I, Session 1976-77, H.M.S.O., 1977).
views on the nature of P.D.C. and on the type of nationalised industry which should be a recipient. The basic criteria as laid down by the Treasury in the experimental period of the mid-1960's have continued to apply. The Treasury viewpoint was expressed to a Select Committee on the Nationalised Industries that:

"Exchequer Dividend Capital (now P.D.C.) ... is only suitable for those nationalised industries which are fully viable but which are especially subject to fluctuating returns as a result of their trading conditions, the nature of their assets, etc. It would not be suitable for nationalised industries which have difficulty in breaking even, taking one year with another, because it would become little more than an interest-free, non-repayable advance...."

This policy has subsequently been re-affirmed in the 1978 White Paper on the nationalised industries (Cmnd. 7131), in which the Government rejected a suggestion by N.E.D.O. that P.D.C. should be provided to a greater number of state industries. The basis of this rejection is that industries with P.D.C. must be both viable and trading in intensely competitive markets for their products or services. P.D.C.-financed state corporations are generally those which trade in internationally competitive markets, but this is not the sole criterion by which the competitiveness of an industry is determined for P.D.C.-

purposes: Giro, for example, only competes with domestic banks.¹⁰

On the basis of the views contained in the 1978 White Paper and the grounds for the dismissal of B.R.'s claims at the initial, development state of P.D.C., it is clear that the major concern of the Treasury was with the viability of the railways. By this criterion, B.R. was unacceptable as a serious contender for P.D.C. In the words of the Treasury, the P.D.C. would become an 'interest-free, non-repayable advance'. Therefore, the viewpoint expressed by B.R. - that, because of risky trading conditions, fixed interest payments distort its reported financial results relative to more stable industries and those with equity or P.D.C. - can be seen to be a necessary, but not sufficient, condition for P.D.C. to be granted. These issues are taken up further below, after an appraisal of the case for equity capital at B.R.

THE CASE FOR EQUITY CAPITAL

It has been suggested above that P.D.C. might be regarded as the public sector surrogate for private sector equity capital. It

was also noted that, despite persistent claims for P.D.C., British Rail has always been denied this form of finance. Indeed, under existing arrangements, B.R. seems most unlikely to receive P.D.C. However, if it is assumed, pro tempore, that B.R. might receive P.D.C., the question is raised as to whether a private equity stake would be a superior alternative. In any such discussion of the merits of ordinary share capital, the attributes of P.D.C. are of great importance, given its origins as a public sector proxy for equity. Indeed, there are two possible defects of P.D.C. which might provide grounds for the proposal of introducing equity:

(i) P.D.C. is simply 'window-dressing',
(ii) P.D.C. could result in the attenuation of private property rights.

Each of these issues is considered, in turn.

(i) Window-dressing

The allegation that P.D.C. is simply a form of 'window-dressing' has been made most forcibly by Foster (1971, p.149), as follows:

"A few Boards are able to borrow on so-called equity stock from Government (i.e. P.D.C.), but in present circumstances this is window-dressing, since all it means is that, when times are bad, the Board does not default on its interest payments but stops paying dividends, which is apparently thought to look more respectable."

Technically, this criticism is incorrect, as P.D.C. is not 'borrowed', it is, as noted above, permanent capital of the state industry. Nevertheless, Foster is not alone in his view that P.D.C. is simply 'window-dressing'. Indeed, early reports of S.C.N.I.'s
on P.D.C. concluded that this form of finance could actually distort (contrary to B.R.'s viewpoint) the reported financial results of nationalised industries and that the reasons for this form of finance were primarily 'psychological' or 'behavioural'. Thus, in a bad year, a deficit might be avoided because of the ability to vary financial costs, which will maintain 'management's morale'.

A further example of this kind of argument is contained in Howe's (1971) examination of the financing of British Steel Corporation (B.S.C.) with P.D.C. In the B.S.C.'s (successful) attempt to obtain an element of P.D.C. in its capital structure, it argued that, if the steel industry experienced a recession and a number of deficits were caused by the industry's inability to cover fixed financial costs, the cumulative effect would be,

"... extremely depressing to the morale of all employees ... it would also prejudice the recruitment of staff and operatives of high calibre ..." (Howe, op.cit., p.316)

However, on closer inspection, these allegations of 'window-dressing' are unfounded. Indeed, the arguments advanced as 'behavioural' reasons for the provision of P.D.C. are only secondary to the principal reason for the existence of P.D.C., i.e. the exposure of state industries to risky operating conditions. Thus B.S.C.'s claims of a 'behavioural' nature stem directly from the nature of their activities which were alleged to be highly variable, with consequent

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11 See S.C.N.I., Ministerial Control of the Nationalised Industries, Vol, Session 1967-68, pp.133-134. More popular support for this viewpoint can also be found - see, for example, 'Accounts for State Boards', Financial Times, 26.2.79.
variation in reported financial results. Indeed, such arguments are derived from the notion of variability of returns inherent in business risk. Thus what has been presented as a 'behavioural' argument for the use of P.D.C. can be seen in its perspective: the possible effects on management 'morale' of the neglect of the fundamental reasons for P.D.C.

Furthermore, the allegations of the S.C.N.I. that the influence of P.D.C. could distort financial results is unfounded. Basically, the S.C.N.I. reservation was expressed on the grounds that some state industries had financial objectives which were set before interest and some had financial objectives, net of interest. This criticism fails to take account of the fact that interest costs have to be borne and that the objectives themselves might be inconsistent. It also operates under the assumption that it is an industry's financial objectives which will be of concern at the financial year end and not its actual financial result (including the meeting of interest costs). It is suggested here that financial results, net of interest payments, is of prime concern. This issue is taken up further within chapter 3 below.

Nevertheless, while the allegation of 'window-dressing' cannot be regarded as sufficient reason for the substitution of P.D.C. by equity capital, there are other, more powerful, arguments in favour of such a change. These arguments are discussed within the next section.
(ii) **Attenuation of private property rights**

Private property rights have been defined as ".... the rights of individuals to the use of resources" (Alchian, 1965, p.817). The effect of state ownership is a denial of such rights. Thus, while B.R. is owned by the state, it is not possible for individuals within the state to increase their ownership in B.R., nor to decrease their ownership stake in it. In this way, individuals within the state are denied the right to arrange their investments in a manner which best reflects their attitude to risk.\(^1^2\)

The argument that an equity stake should be introduced at B.R. (or, indeed at any other state corporation) to avoid the attenuation of private property rights is therefore an argument against it being primarily dependent on any form of state finance. Thus, it might be argued that, even with debt finance, there is attenuation of private property rights. At best, the reliance on debt finance provides a measure of financial discipline in that it requires interest payments to be made. However, the 'property rights' proponents would argue that this, *per se*, does not guarantee that these industries will operate in the interests of their owners (the Government, on behalf of the nation), in the absence of the right of individuals within the state to increase or decrease their stake in B.R.\(^1^3\)

Indeed, the introduction of P.D.C. might exacerbate the status quo in B.R.'s capital finances, in that it is presented as the public sector equivalent of equity

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\(^1^2\) See Alchian, *op.cit.*, pp.822-827.

\(^1^3\) See, for example, Millward (1978), p.17.
(which, of course, has property rights). However, not only is P.D.C. 'owned' entirely by the state, but it also concedes discretion over the servicing of P.D.C. to the state industry itself.

Therefore, the 'property rights' school of thought prefers the alternative of equity capital. Its principal proponents favour this product of the capital market rather than the institutional arrangement of granting P.D.C. One of its most noted proponents, Wiseman (1978, p.10) has expressed this viewpoint, as follows:

".... (in) the capital market ........ there exists a set of individuals with a direct interest in the profitable use of the firm's assets and with institutional arrangements through which their emerging judgements can be reflected in new decisions ...." (emphasis inserted).

Here, the principal distinctions are (a) the direct link between the shareholders interests and the aims of the firm and (b) a device (the capital market) by which this congruence is achieved.

In practical terms, the mechanisms which facilitate this are (i) the existence of share prices (and, thereby, valuations made independently of the firm) and (ii) the threat of liquidation, which is regarded as being absent in state industries (Wiseman, op. cit. p.14). These devices reinforce the aims of profitable operations of a given firm. Thus, changes in share prices by sets of owners investing and disinvesting can lead to pressures on those firms whose managements have a poor profit record (Alchian op. cit., p.827). Also, the threat of liquidation is a further sanction against such management.
However, the implications of a return to private capital at B.R. are far-reaching. Indeed, its introduction strikes at the very origins and nature of state industries. It is not surprising, therefore, that such proposed changes have led to:

(a) criticisms of the equity capital alternative,
(b) another proposal for access to capital markets which stops short of the equity capital alternative.

These issues are now considered.

(a) Criticisms of equity capital

Two specific criticisms might be made against the proponents of equity capital in state industries:

(1) The abovementioned aim of 'profitability' for such industries is inappropriate.

(2) The absence of the threat of liquidation is overstated.

As regards (1) above, it might be argued that a state industry should remain so and that the introduction of private capital might lead to an abuse of monopoly power by seeking excess profits to the benefit of a limited number of shareholders at the expense of other members of the nation. Also, the restoration of an industry, such as B.R., to private ownership might lead to a neglect of divergences between private and social costs and benefits.14 However, it is interesting

14 Such arguments against equity capital in the nationalised industries were first advanced in the Radcliffe Report (para 593, Report of the Committee on the Working of the Monetary System, Cmnd. 827, H.M.S.O., 1959). They have also been taken up by others when the prospect of equity capital for state industries is raised (see, for example, Webb, 1971, p.293).
to note that Wiseman (1964) advocated the introduction of equity capital in the railways, specifically on the grounds that they were unable to abuse monopoly power, as they operated in a competitive environment. The issue of whether there is a need for the railways to have a wider objective than profit, as measured by private costs and benefits, is not considered here, but is explored in some depth below.

As regards (2) above, the absence of the sanction of liquidation for state industries was acknowledged by the Government in its most recent White Paper on these industries. However, there are public sector proxies for private sector liquidations. The most likely methods of dealing with nationalised industries in severe financial difficulties would be a capital reconstruction or a reduction in the size of the industry. The first option is the most evident one but this falls far short of a private sector liquidation. However, the second option need not be taken explicitly, as in the case of the Beeching proposals for the railways in the 1960's. Indeed, this effect can be achieved by denying these industries funds for investment at a level which maintains existing capacity. Nevertheless, whether explicit or not, this represents recognition of a capital loss to the industry (and the taxpayer). However, this also falls short of the termination of the business which might be expected in the private sector if persistent deficits occurred.

(b) Another capital market proposal

The abovementioned criticisms of equity capital in state industries have resulted in another capital market proposal, which falls short of the restoration of such industries to private ownership. Thus, Heath (1976) and Lumby (1981) have proposed that state industries should be able to raise long term finance in the capital markets in the form of redeemable, cumulative, participating, preference shares.16

However, this alternative not only fails to overcome the criticisms of the equity capital option, but it also has defects which are peculiar to it. In effect, the Heath-Lumby proposals consist of a form of debt capital (i.e. it is redeemable, and it has a prior right to capital and arrears of income) which has rights consistent with an equity stake (i.e. a participating share which carries voting rights).

It is not evident how this form of capital finance would overcome the criticisms of equity capital, namely, that its introduction would result in an emphasis on profitability to the neglect of the wider interests of the community at large. Indeed, dependent on the size of such holdings, such investors could control the composition of the Board and the aims of the industry, such that a state industry would be run in the interests of a narrow section of the community (i.e. shareholders). It might be possible to mitigate this by strictly limiting the numbers and rights of these shareholders. However, this

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16 For further details of such proposals, see J. Heath, Appendix E, N.E.D.O. (1976), and Lumby (1981).
might reduce the attractiveness of this investment. Indeed, in a similar situation to this in the 1950's at London Transport, Edey (1954) noted the thinness of the market in such shares and the beleaguered position of such shareholders.

Furthermore, by proposing a form of finance which is very similar to debt (although possibly even more attractive to typical debt-holders, given the prospective rights of control), this option is constrained by the so-called 'identification problem', encountered in the early 1950's. At this time, nationalised industries still had the right to raise debt capital on the open market by themselves. However, the demands for capital by the state corporations and the unattractiveness of their stock to investors were such that an accumulation of unsold nationalised industry stock existed at this time. This presented the Government with a major crisis of monetary management. This precipitated the withdrawal of the nationalised industries' right of direct access to U.K. capital markets. It has subsequently been argued that there exists an 'identification problem' if state industries can raise debt on the capital market. That is, their relationships with Government are so close that it is unlikely that investors would differentiate between separate issues of stock by nationalised industries and those of Government, with the

17 See Radcliffe (op.cit.). Indeed, B.R. was a major contributor to this crisis as it was proceeding with its postwar Modernisation Plan at that time, which entailed heavy capital commitments.

18 See, for example, Radcliffe (op.cit.); Wiseman, (1964); Webb (1971).
possibility that the timing of these separate issues could prove embarrassing to the Government's monetary policy.¹⁹ On these grounds, the 'Heath-Lumby' proposal seems an unattractive and unlikely policy option.

PUBLIC DIVIDEND CAPITAL OR EQUITY: SOME WIDER ISSUES

The above discussion has suggested possible defects of both P.D.C. and equity capital. Thus P.D.C. might be preferred as the more desirable form of risk capital for state industries because the retention of state ownership facilitates the setting of wider objectives than profitability for such industries. On the other hand, it might be argued that P.D.C. is a poor proxy for equity as it lacks essential ingredients which pressurise managements into taking account of shareholders' views, such as share prices and the ultimate sanction of liquidation. Nevertheless, it is evident that the provision of both of these forms of capital finance is based on essentially the same set of circumstances. These might be summarised as follows:

(i) The existence of a profitable opportunity.
(ii) The appropriateness of the profit objective.
(iii) The exposure of the business to risk.

¹⁹ Indeed, the Government has repeatedly re-affirmed its opposition to a return to the policy of the early 1950's. on these grounds. See H.M. Treasury, Cmnd. 1337 (1961); Cmnd. 3437 (1967), and Cmnd. 7131 (1978).
Thus, as regards (i), just as P.D.C. has not been granted to B.R., because doubts have been expressed about its profitability by the Treasury, so it would be unthinkable that equity capital would be attracted to an unprofitable opportunity. Similarly, on (ii), criticisms have been made of the relevance of equity capital to state industries on the grounds that profit alone is not a satisfactory objective for such industries. However, P.D.C. has not been granted to state industries which are suspected of having a wide divergence between private and social costs and benefits. Finally, regarding (iii) above, equity capital (or risk capital, proper) is an accepted form of capital finance for industries which are exposed to fluctuating returns. This is also a fundamental criterion by which P.D.C. is granted to state industries.

Therefore, given this common set of circumstances for the provision of both forms of risk capital, the rest of this thesis is devoted to determining whether the conditions exist for the provision of risk capital, of whatever form. However, this thesis cannot provide a definitive answer to the appropriateness of either of these alternatives. The actual decision as to whether P.D.C. or equity represents the 'best' alternative is properly one for policy-makers. Nevertheless, it is hoped that the findings of this thesis can guide policy-makers. An overview of how this might be achieved is set out below, before the detailed assessment of the prospects for risk capital is made.
A profitable opportunity

It must be acknowledged from the outset that the status quo at B.R. does not represent a profitable opportunity. This applies whether the perspective taken is that of H.M. Treasury advising the Government on the provision of P.D.C. or that of a private, equity investor. Therefore, the existence of a profitable opportunity at B.R. is dependent on the identification of that segment of its operations which is (actually or potentially) profitable.

This thesis examines the prospect that the operating services (the carriage of freight and passengers) might be segregated from the provision of infrastructure (the 'permanent way' of track, signalling facilities), as such a profitable opportunity. This proposal is not new. The existing, and historical, precedents for its adoption are traced. The rationale for such a segregation is only briefly outlined here. It is discussed in depth in chapter 2. The reasoning behind this proposal is that (a) the absence of some system of road pricing distorts the allocation of resources between road and rail, and that some subsidy is therefore necessary for railway infrastructure (but not for the operating services) and (b) there are such fundamental differences between these respective elements of all transport systems (i.e. the operating services and the infrastructure) that the segregation of the railways in this way would permit the market in transport services to operate more efficiently.

The discussion presented is largely conceptual. It does not represent a blueprint for a detailed reconstruction of British Rail.
Nevertheless, it does identify a possible, 'profitable opportunity' at B.R. It also represents a means by which policy makers might organise B.R. more effectively, without introducing risk capital.

(ii) The appropriateness of the profit objective

The nature and measurement of what constitutes 'profit' has long fascinated accountants. Indeed, distinctive schools of thought are in evidence on how 'profit' should be measured. However, the controversies surrounding what constitutes the 'ideal' measure of profit are largely irrelevant to the present discussion. There are two principal reasons why this is so.

In the first instance, the aim of this thesis is to examine the applicability of risk capital (P.D.C. or equity) to the reconstructed railway operating services, as a state industry (P.D.C.) or as a private corporation (equity). Thus, this issue is examined in the context of the appropriateness of the information supplied to policy-makers. However, both state industries and private sector corporations apply the same bases of accounting measurement. Therefore, at this level of discussion, the 'ideal' measure of profit is irrelevant, as the basis of accounting measurement would be the same, regardless of whether a given industry is state-owned or not.

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20 Thus mainstream accounting thought is represented by current cost accounting, as expressed in Statement of Standard Accounting Practice Number 16. However, there are numerous minority views. An example of this is the isolated advocacy of historic cost accounting by Ijiri (1971). Another minority view is that of the 'allocation-free' school of thought, which advocates the use of cash flow and realisable values or some mixture of both - Thomas (1969; 1975; 1979) and Lee (1972; 1980).
Nevertheless, in the above discussion of the case for equity capital, it was hinted that this state of affairs might not continue. Specifically, there is an argument that state industries should have radically different objectives from those of private sector enterprises. Indeed, it was suggested that this was one reason for rejecting the equity capital option for these industries. However, the adoption of such 'radically different' objectives might also undermine the prospects of the reconstructed railway operating services receiving P.D.C. Thus, it was noted earlier that P.D.C. would not be granted to a state industry which could not break even. Similarly, it was observed that equity capital would not be provided unless there exists a profitable opportunity. However, there are distinctive policy options which have been proposed for state industries which might result in the incurrence of financial deficits, as a matter of intent.  

There are three major policy options which might entail the incurrence of such deficits: (a) the adoption of (unconstrained) marginal cost pricing, (b) the maximisation of net social benefits as a primary objective, and (c) the pursuit of non-financial aims to the (possible) detriment of financial discipline. All three of these options have their intellectual roots in the notions that (1) state industries are fundamentally different from private sector industries

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21 In this context, it is important to note that, of the numerous possible measures of income (such as those outlined in footnote 20), none of their proponents has actually advocated the intentional pursuit of deficits (however measured).
and (2) as a consequence of such fundamental differences, ownership of these industries should be vested in the state and they should be given objectives other than the typical profit-seeking goal in the private sector. Therefore, to the extent that such policies are applicable to the reconstructed railway operating services, (i) it is unlikely that equity capital would/should be permitted to take control of this corporation and (ii) it is also unlikely that this proposed corporation would ever receive P.D.C.

These issues regarding the appropriateness of the profit objective to the reconstructed railway operating company are examined below in two stages. First of all, the relevance of existing measures of profit or loss is assessed. This is examined by determining to what extent existing measures have been of importance in the financial regulation of state industries, in general (chapter 3) and, specifically to B.R. (chapter 4). However, there remains the prospect of such measures being supplanted by radical alternatives. Such possibilities are explored in chapters 5 ('social profit or loss') and 6 (non-financial indicators).

(iii) Business risk

The riskiness of the reconstructed railway is examined in two sections. The first of these explores the applicability of Public Dividend Capital; the second examines the suitability of a private equity stake. The material pertinent to P.D.C. is discussed in chapters 7, 8 and 9; that pertinent to equity is assessed in
chapters 10 and 11. These two sections are very different in nature, as the P.D.C. material is essentially qualitative and that relevant to equity is quantitative. Nevertheless, both sections seek to analyse the same basic issue, i.e. whether 'the profitable railway' would be exposed to sufficient business risk to merit some form of risk capital. In this context, business risk is defined as the inherent uncertainty in a given firm's operations and is a function of sales volatility and operating leverage (after Solomon (1963), Archer and D'Ambrosio (1972), Bierman and Hass (1975), Gahlon (1977) and Conine (1982)). Thus, the level of business risk determines the extent to which the financial risks of the business might be shared between long-term finance with fixed interest obligations and that with variable returns.

The analysis of the material pertinent to P.D.C. is a longitudinal study of the important risk factors to which it is exposed, as perceived by B.R. itself. It is based on an analysis of B.R.'s Annual Reports from 1963 to 1980. Within these reports, persistent themes which highlight such risks were identified and evaluated. There are two limitations in such an exercise, neither

22 It might seem somewhat inconsistent to describe business risk as uncertainty. Indeed, many years ago, F.H. Knight (1921, p.1) made the observation that a measurable 'uncertainty', or 'risk proper' was so far different from an unmeasurable one as not to be an uncertainty at all. That is, probabilities can be assigned to situations of risk, but in situations of uncertainty, outcomes are entirely unknown. Nevertheless, the finance literature frequently uses these terms interchangeably and this convention is adopted here.

23 The identification of such themes is based on procedures of analysis of qualitative data which are well established in the social sciences, but little used in the analysis of accounting information as a source of data. See, for example, Berelson (1952), Angell and Freedman (1953), Cartwright (1953), Madge (1953) and Sellitz et al. (1965).
of them serious. In the first instance, the aim of this analysis is to determine whether a state-owned version of the "profitable railway company", as set out in Part II of this thesis, might be exposed to sufficient risk to merit the introduction of Public Dividend Capital. However, this section, as an analysis of B.R.'s past experience, inevitably relates to B.R. in its existing form, rather than in the proposed reconstruction with the separation of the operating services and the infrastructure. Therefore B.R.'s experiences are taken as a proxy for those which a reconstructed state railway corporation might expect to encounter. A second limitation on this type of investigation is the extent to which B.R.'s Annual Reports, as self-reporting data, might promote bias or distortion in the results obtained. The possibility of bias, i.e. the false or distorted reporting of results, is evaluated by assessing the issues raised by B.R. against events, reports and data over which B.R. could exercise no influence or control. In this way, the evaluative process eliminates, or at least minimises, the threat of bias.

The examination of the evidence relevant to the possibility of introducing Public Dividend Capital at a reconstructed railway rests on three principal themes identified within B.R.'s Annual Reports:

(i) Market Pressures,
(ii) Labour Relations,
(iii) Relationships with Government.
All of them point to the existence of business risk at B.R. The first of these, Market Pressures, is the most obvious aspect of business risk at B.R. This affects B.R. in three ways. In the first place, B.R.'s level of activity is strongly cyclical and its operating revenues (particularly freight) reflect the cyclical state of the overall economy. Lack of stability is, of course, a major and conventional raison d'être for risk capital. Also, within the two main rail businesses, there are additional, pertinent factors. The rail passenger services operate in a competitive market, as does the freight business, but there is also the particular problem for the railways that they are reliant on a small number of principal customers, notably the coal, iron and steel industries. These issues are discussed in chapter 7 below.

The second risk factor identified as a consistent theme in B.R. Annual Reports is that of Labour Relations. Given the labour-intensive nature of the rail industry, this has constituted a two-fold risk. Firstly, there has been a vulnerability to external industrial disputes, with a consequent loss of revenue. Furthermore, while reported internal disputes in the period covered (1963-80) have been limited, there is evidence of the latent strength of organised labour as measured by management's inability to achieve the productivity increases it has sought and in the level of wages paid to rail workers. These issues are discussed in chapter 8 below.

The final theme identified, Relationships with Government, might appear to be an unlikely 'risk factor'. Indeed, the
ramifications of B.R.: Governmental relationships are such that this theme proved to be the most complex to disentangle and assess. Nevertheless, it is shown below (in chapter 9) that this is indeed a 'risk factor'. Thus, the variability of profits at B.R. appears to have been made greater than it might otherwise have been by the intervention of Government. This was particularly so in two areas: pricing and investment policies. In the first of these, the intermittent and uncertain pressures of intervention in pricing which appears commonplace in state industry is shown to be worse at B.R. than is the case at most other nationalised industries. As for B.R.'s investment policies, there are two issues involved. The first, relating to the execution of its investment programme, is that major uncertainties surround its financial planning because of Government intervention. This is upheld on the basis of available evidence. The second, that B.R.'s riskiness is greater than it should be because it is not allowed to diversify its investments into non-rail businesses, has little support. However, this negative finding is not as serious as it seems, because the reorganised railway operating services, as set out in Part II, are envisaged as being confined to railway services only. Overall, the influence of Government over a reorganised state railway corporation might be expected to continue and, indeed, to constitute an element of business risk at such a corporation. Therefore, it is suggested here that there is justification in the claim that B.R. has (as would have, for the purposes of this thesis, the reconstructed B.R.) been subject to business risk
and, on these grounds, a state-owned version of the profitable railway operating services merits some measure of P.D.C.

The second part of this analysis seeks to determine whether the 'reconstructed profitable railway' envisaged in Part II of this thesis might be sufficiently risky to attract a private equity stake. However, the riskiness of publicly quoted share prices is perhaps best expressed in terms of the market model of share price behaviour. This model\textsuperscript{24} asserts that returns on shares are a linear function of a market factor common to all shares. It is expressed as follows:

\[ \tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{M_t} + \tilde{\varepsilon}_{it} \]

where:\textsuperscript{25}

- $\tilde{R}_{it}$: the rate of return on asset $i$, for period $t$
- $\tilde{R}_{M_t}$: the aggregate rate of return on all securities in the market
- $\alpha_i, \beta_i$: respectively the intercept and slope associated with the linear relationship
- $\tilde{\varepsilon}_{it}$: independent factors unique to share $i$.

\textsuperscript{24} This model takes its theoretical justification from the theory of capital market equilibrium developed by Sharpe (1964) and Lintner (1965), in which it was demonstrated that, in equilibrium, the risk premium for an individual share is proportional to the risk premium for the market, therefore $\beta$ can be utilised as a measure of risk for individual shares. Furthermore, the portfolio theory of investment behaviour also vindicates the market model. In this theory, the prospective investor seeks to minimise risk by diversification of investments within his portfolio. However, as Evans and Archer (1968) have shown, $\varepsilon_{it}$ are of limited significance in a well diversified portfolio and $\beta$ values are therefore the best measures of the risk of the portfolio and of the individual shares within it.

\textsuperscript{25} The tilde indicates a random variable (i.e. one subject to a probability distribution) - see footnote 22.
In this case, however, the absence of an existing equity stake eliminates the use of the market model to assess B.R.'s riskiness as there is no individual security price, \( i \), for B.R. and no market index, \( M \), to which it belongs, as reference points. An alternative is the estimation of the so-called 'accounting beta' (see, for example, Bowman (1979)), which seeks to measure riskiness without reference to market indices. Indeed, there is empirical evidence which suggests that accounting indicators might serve as a proxy for \( \beta \), the coefficient of non-diversifiable risk. Thus, Beaver, Kettler and Scholes (1970) and Beaver and Manegold (1975) have shown that measures of systematic earnings volatility (i.e. accounting betas) show significantly positive correlations with a share's beta defined in terms of market returns on these shares. Also, Lev (1974) showed that earnings volatility (as measured by operating leverage) was directly related to overall and systematic risk of common stocks. Furthermore, Beaver, Clarke and Wright (1979) have shown that shares with the greatest percentage changes in earnings also have the highest betas. Therefore, the evidence of this behaviour of share prices suggests that earnings volatility is associated with systematic (non-diversifiable) risk.\(^{26}\) All of this suggests that accounting

\(^{26}\) Indeed, at the theoretical level, it has also been demonstrated that systematic risk (as represented by \( \beta \)) is related to business risk (Conine, 1982). However, Conine expressed business risk in wider terms than earnings volatility, but see the discussion below, in the main text, on the derivation of a comprehensive accounting beta.
measures, based on book values, might be utilised to determine the relative riskiness of state and private sector corporations. However, this evidence is not beyond criticism. Indeed, the absence of share prices poses fundamental, perhaps intractable, problems in any statistical investigation which seeks to compare the capital financing and relative riskiness of public and private corporations. Nevertheless, an attempt is made to devise such an exploratory model in Chapter 10. The nature of the problem, and the limitations of available data, make the inferences which can be drawn from the results of this analysis preliminary. In any event, the actual results obtained are somewhat inconclusive.
Chapter 2

IN SEARCH OF A PROFITABLE RAILWAY

The persistent financial deficits of British Rail are a matter of historical record. This is despite repeated attempts at financial reconstructions which were aimed at identifying a profitable railway. However, it is the contention of this paper that it is possible to have a profitable railway corporation. It is argued here that these successive attempts at the identification of the 'commercial core' of British Rail's operations have failed because they have treated the railways as a vertically integrated system and not taken account of the fact that there are two, quite different, parts of the railway system: (a) the provision of the railway infrastructure (i.e. the 'permanent way' of track, signalling and support facilities), and (b) the provision of carriage facilities for passenger and freight. This distinction raises the possibility that the provision of railway operating


2 It might be argued that, regardless of the feasibility of a profitable railway, its desirability is open to question. This issue is addressed in Part III of this thesis. This shows that the railway's record of profit or loss is important in its regulation, in common with all state industries (chapter 3) and alternative objective functions, such as 'social profit or loss' and nonfinancial indicators of performance are, respectively, nebulous (chapter 5) and of limited value, unless combined with profit or loss (chapter 6).
services might be segregated from the railway infrastructure, as a 'commercial core'. This suggestion is neither new\(^3\) nor is it anachronistic.\(^4\)

The proposal to reconstruct the railways in this fashion stems not only from historical and existing precedents, but also from:

(1) A continuing debate regarding the co-ordination of inland transport, and

\(^3\) Thus, in the early 19th century, the railway companies owned the infrastructure and other organisations were carriers. Sometimes these carriers were the sole operators, sometimes they competed with each other and railway companies. Bonavia (1954, p.38) attributed the cessation of this to (a) the need to bring all trains under a single control because of increased speeds and (b) the denial of access to essential facilities (e.g. water-towers) by railway companies. However, item (a) is not a sufficient reason for the operator exercising 'the single control' to own the line as well, and item (b) appears to be the more likely reason for the elimination of this competition.

\(^4\) Indeed, in the recent past, Pullman passenger services were offered by an independent operator and, at present, there is considerable use of the permanent way by privately owned freight traffic. (In 1981 this consisted of 17,244 vehicles, of which 11,483 were oil tankers, and, overall, this represented 19.6 percent of British Rail's freight vehicles.) Furthermore, a version of this policy has already been implemented in the U.S. with the establishment of the National Rail Passenger Corporation ('Amtrak') in 1971. Amtrak actually has some track, but this is a mere 621 miles of route which it obtained as a result of the Penn Central bankruptcy in 1975. Thus Amtrak is cited here as an example which demonstrates that it is indeed feasible to organise railways in this way. However, the Amtrak experience cannot be used, without reservation, as a means of judging the effectiveness of the policy of segregation. Indeed, Amtrak has proved a financial failure, with operating deficits throughout the years 1971 to 1978 (see Hilton, 1980, p.58). To a large extent this was predictable, because Amtrak consisted of the unprofitable services which their previous owners had transferred to Amtrak at its inception. Therefore, this is not a direct parallel of the suggestion in the main text to segregate operating services (particularly the profitable segments) and infrastructure. Also, the inevitability of Amtrak's financial failure was heightened by its deliberate policy of concentrating on "quality of service" rather than the high sensitivity of demand for its services to price and frequency (Hilton, op. cit., p.65). This issue is taken up further in chapter 6, below.
(2) differences between the essential attributes of transport operating services and those of infrastructure, and their influence on market structures.

Issue (1) relates to a major imperfection of the market-place for transport - the absence of a system of pricing for the use of roads. One viewpoint is that, while a system of road pricing might be preferable, the status quo (with tax charges as a proxy for prices) provides a satisfactory means of allocating resources between modes. However, the absence of road pricing has led to 'second-best' proposals that railway operating services and infrastructure should be segregated. The aim of this suggestion is to distinguish between those sections of railways which merit subsidisation (the infrastructure) and those which should be profitable (the operating services), such that operating inefficiencies cannot be obscured by infrastructure subsidies. It is shown below that, not only is reliance on taxation as a means of such resource allocation a dubious exercise, but also that the proposed segregation would improve both the allocation of resources and the assessment of B.R.'s financial performance.

Also, regarding (2) above, it has been suggested that there are differences of a fundamental nature between the principal assets of the operating services and the infrastructure (for road, rail, air and sea) and that such differences inevitably lead to operating service competition and infrastructure monopoly (Thomson, 1974). Thus on the one hand, the operating services are alleged to have principal assets which are relatively inexpensive as measured both by capital outlays and by opportunity costs (particularly relative to those of
infrastructure); they are short-lived and exhibit little characteristics of indivisibility. This contrasts with the principal assets of the infrastructure, which, Thomson suggests, tend to have high capital outlays and opportunity costs; exceptionally long lives and are highly indivisible. As a result of this Thomson (op.cit., p.42) has argued that, with the exception of rail by dint of its statutory monopoly, the operating services are highly competitive because of weak barriers to entry, which permit small operators to quickly enter such markets. As regards infrastructure, Thomson (op.cit., p.44) has asserted that the opposite holds true with its supply exhibiting powerful monopoly tendencies.

The strength of the case for the segregation of railway operating services and infrastructure on the basis of arguments (1) and (2) is assessed below. This demonstrates that there is a sound economic rationale in such a financial reconstruction of British Rail.

1. THE CO-ORDINATION OF INLAND TRANSPORT AND THE ROAD PRICING PROBLEM

In an ideal world, the co-ordination of inland transport would be effectively and efficiently determined by the price mechanism. This would allow consumers to express their preferences regarding the different modes of travel available and would also allow the effective assessment of the financial accountability of service operators. However, it has been suggested that a major impediment to such
co-ordination in transport has been the absence of a system of road pricing\(^5\) (Munby, 1960, 1968; Stewart, 1965; Roth, 1967; Foster, 1975; Higgins 1979). Despite the persistence of the road pricing advocates, this policy has never been implemented. As a result, road pricing proponents such as Allais et al. (1965) and Oort (1969) have suggested the segregation of railway operating services and infrastructure as a 'second-best' solution to assist in both the co-ordination of inland transport and the improvement of the financial accountability of railway services.

In essence, the 'Allais-Oort' proposal for the reconstruction of the railways is based on the proposition that central co-ordination of infrastructure is necessary, given the piecemeal operation of efficient pricing systems in its use.\(^6\) They also argued that a secondary effect of the absence of road pricing would be under-utilisation of railways and, thereby, railway deficits. These deficits were seen as legitimate to the extent that they were a

\(^5\) It should be made clear from the onset that this refers to a system of tolls, preferably an electronic one which measures distance travelled and relates it to the time of the journey (Barber, M. and F. Mellett (1971), p.43).

\(^6\) As such, this scheme has the proposals of Mance (1940, 1941), Lewis (1949) and Sargent (1958) as antecedents. All of these shared a common concern over the need to co-ordinate transport infrastructure. Mance and Lewis specifically raised the possibility of segregating railway operating services and infrastructure. However, these writers were preoccupied with the charging systems applied to motor vehicles and the feasibility of placing railways and motor vehicles on a common footing, usually in the context of overall budgetary equilibrium. There was no addressing of the problem of road pricing as envisaged by its more recent proponents.
consequence of misallocation of resources because of the breakdown of the price mechanism for infrastructure. However, as they afford the opportunity for management to hide inefficiencies in the operation of the railways, Allais et al. saw the separation of infrastructure and operating services as a necessary prerequisite of subsidisation. Thus, Allais et al. (para.1094, p.155) argued that;

".....the financial matters connected with the infrastructure and transport services (should) be kept completely separate, so as to prevent any deficit that might be occasioned by inefficient management from being confused with the infrastructure deficit....."

The above case for the separation of railway infrastructure and operating services rests on the assumption that road pricing is desirable (if unattainable, for the foreseeable future). However, the viewpoint that a road pricing system is desirable has been contested by that school of thought as typified by Pryke and Dodgson (1977),7 which sees the existing system of taxation as a satisfactory proxy. Thus, Pryke and Dodgson (op.cit., p.43) have asserted, specifically in the context of freight, that

7 Others included in this school of thought are Paul (1959), an early critic of Munby's proposals on road pricing; Jennings (1979) who places a great deal of faith in levying taxes as an instrument of economic efficiency, an issue which is taken up in the main text; and, to a lesser extent, Harrison (1979), who accepts the status quo on the grounds of equity, while expressing reservations regarding its efficiency.
"...One of the hoariest arguments in the area of road-rail competition is that British Rail has been at a disadvantage because, while the railways have to pay to maintain their track, road hauliers receive theirs' free. Of course, road hauliers do pay to use the roadwork (sic) through taxation, so a more sophisticated version of the argument is that road hauliers do not pay enough in tax to meet the costs they impose.... The estimates of road track costs show that, until recent years, road freight users did contribute in taxation to cover their track costs."

Pryke and Dodgson base their stance, and, therefore, their defense of the status quo, on the amounts of tax (road and fuel) levied by the Government on road vehicle users. In their view, the costs (i.e. maintenance and capital improvements) of the road system are adequately recouped by such taxes. However, regardless of whether such taxation does, in fact, adequately recoup the costs of road provision, its acceptance as a proxy for a pricing system has the following severe limitations:

(i) Administratively-determined tax charges are insensitive to consumer preferences relative to market prices, with important implications for resource allocation, and

(ii) Government tax-gathering policies further distort the effectiveness of a tax charge as a surrogate for a price.

(i) Insensitivity of tax charges

As regards (i) above, the coarseness of tax charges as an alternative to the price mechanism stems from a number of sources. In the first instance, it is important to note that the recovery of the costs of road provision by tax charges is based on the sharing out of such costs amongst the road user groups. Thus it
can be seen that the underlying aim is one of equity (between road user groups) rather than that of economic efficiency.

It is also important to note that, while some attempt is made at distinguishing between the various road user groups (cars; buses and coaches; heavy goods vehicles; light vans), the exercise of sharing out such costs between them is an allocation and is, therefore, essentially arbitrary. This allocation is made in two parts: (a) costs specifically attributable to heavy goods vehicles and (b) the remaining costs which are allocated across vehicle groups on some 'reasonable' basis. The first of these entails the allocation of a higher proportion of capital costs to heavy goods vehicles (to reflect the need to provide higher clearances and stronger carriageways), plus all surface maintenance costs of classified roads. The second shares out remaining road costs between user groups on the basis of vehicle miles. The arbitrary nature of such an allocation is evident in part (b), as there is no apparent relationship between the extent to which vehicles are used and the incidence of costs such as road construction and maintenance costs, such as policing and lighting. However, even within the first part of the allocation, there are arbitrary elements. Thus, the assignment of set percentages of major (15 percent) and minor (20 percent) construction costs and the heavier weighting of remaining capital costs (each heavy goods vehicle mile is treated as two other vehicle miles) to heavy goods vehicles portrays a degree of precision which is unlikely to exist.
However, not only can such cost allocations be criticised on the grounds that they are arbitrary, but also because they are insensitively applied. Thus, Pryke and Dodgson (op. cit. p. 43), in their own evidence to the SCNI, noted that heavy goods vehicles, as a group, did not yield sufficient taxes to cover its allocation of costs in 1975-76 and yet, ten years previously, all road user groups had yielded taxes higher than their allocation of costs. This implies that, as might be expected, administratively determined charges, unlike market prices, do not have the ability to respond sensitively and quickly to change.

Also, and of even greater importance than this is that, at best, in the determination of such road track costs, the various user groups are merely assigned charges on the basis of costs incurred for particular preferences, without facing the market test. That is, not only are allocation-based charges insensitively applied, but they also fail to take account of consumer preferences in the same manner as market prices. Indeed, if road users faced market prices, it is likely that a different pattern of road usage would result.

Furthermore, the optimal size and composition of the road system, as measured by how much users value, and would pay for, roads of different kinds, is likely to be different from the status quo. This is because the present system of cost-based taxes or charges reverses the determination of 'optimality' via the willingness-to-pay criterion: costs are incurred and, therefore, taxes raised, are
assumed (at best) to equal willingness-to-pay and therefore influence the size and configuration of the road system. Under this regime, the objective function or goal of the road transport system is virtually taken as given, instead of being an independent, exogenous variable.

(ii) The distortions of tax policies

It was also suggested above that a second reason exists for not accepting a tax charge as a proxy for a market price, viz, the Government's tax-gathering policies. Indeed, the arbitrary measure of 'need' for road-space which is referred to in the previous paragraph is further distorted by successive Governments levying additional taxes on road users, over and above the current cost of capital improvements to, and the maintenance of, the road system.

There is a temptation to suggest (as Pryke and Dodgson do, op.cit. p.45) that such additional taxes cover costs which arise from road use (such as congestion and other external costs) in addition to the basic costs of road provision and maintenance. Such additional taxes may or may not 'cover' such additional costs. This in itself is somewhat irrelevant to the central question of the comparability of road and rail track costs.

In particular, this is so because the collection of an overall amount (even if it is assumed that it is equal to total costs incurred) seems unlikely to be reflected in the taxes in a manner which reflects the actual incurrence of such costs by the
various classes of vehicle users. Thus, these additional costs which are attributable to traffic congestion should be borne by road traffic in the form of additional taxation, but are liable to be subsidised by other road users. At this point, however, it is important to note that, if the taxes levied do coincide with costs incurred this is likely to be fortuitous rather than a matter of intent. In its memorandum to the S.C.N.I. on the role of British Rail in public transport, the Treasury stated that (S.C.N.I. 1977, p.263),

"Policy on transport taxes, viz the excise duty and VAT on road fuel, vehicle excise duty and car tax, is the Treasury's responsibility. Revenue-raising and demand-management are the prime considerations here but policy requirements in other spheres - such as transport itself (including choice of modes) and the industrial strategy - are also taken into account."

As indicated above, this approach conflicts with the use of taxes as a proxy for a price system. Indeed, Treasury policy has consistently undermined the possibility that taxes might serve as a surrogate for prices in rationing the use of roads. In the years following the abolition of the Road Fund for all petrol taxes and licence fees in 1955, expenditure on roads never exceeded one-third of the revenue raised from such taxes (Stewart, op.cit., p.14). However, even when this fund existed it was not applied exclusively to expenditure on roads. For example, while expenditure on the maintenance and improvement of roads was £75 million in 1952, £42 million of this was met by local authorities levying rates and
only the balance of £33 million was provided by central government, despite the fact that it had received £338 million in that year from petrol taxes and licensing fees (Bonavia, op.cit., p.172). Similarly, the pre-war Royal Commission on Transport noted in its final report that the Road Fund was 'raided' by the Exchequer in 1927 to the extent of a further £12 million, and that one-third of the duty paid by motor vehicle owners was retained by the Exchequer for 'general revenue purposes' (Royal Commission, 1930, pp.158-159).

The mere levying of such substantial amounts of taxation from a specific group within society, which exceed the current expenditure on that group reflects that group's ability-to-pay rather than its willingness-to-pay. The compulsory nature of such taxation removes the signals for resource allocation yielded by the discretionary nature of pricing systems (assuming some measure of elasticity of demand). All of this: the lack of economic criteria in the pricing (and, therefore, investment appraisal\(^8\)) of road provision; the levying of taxes in excess of the costs of road provision and maintenance which are based on policies essentially unrelated to road provision - points to the employment of arbitrary standards in determining the level and usage of road provision. Therefore, the

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8 The practice of investment appraisal of roads by central government has come under attack for its somewhat simplistic approach. It is by no means a sophisticated attempt at cost-benefit analysis. Also, it suffers from the lack of a pricing 'signal', in that it responds to pressure points on road space as pointing up possible investments, i.e. its emphasis is on supply, not efficiency. (See Millward, 1973, Heggie, 1979).
'self-financing' attribute of expenditure on road infrastructure has to be handled with care.

This, in itself, does not justify particular levels of road expenditure. Indeed, it inhibits the ability to leave resource allocation between road and rail to "the market", as it undermines the pricing system. Indeed, as Allais et al. and Oort have argued, in the absence of a pricing system to ration road use, an underutilised and unprofitable railway system seems inevitable. Therefore, on these grounds, the scheme for the separation of railway operating services and infrastructure has merit. Furthermore, it is shown below that, a fortiori, their separation is justified on the basis of fundamental attributes of the two aspects of transport provision.

2. MONOPOLY, COMPETITION AND THE INFRASTRUCTURE: OPERATING SERVICES DICHOTOMY

The previous section demonstrated that complete reliance on market forces could not resolve the efficient provision of transport services, given the lack of a system of road pricing. It is also

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9 The lack of a price for the use of the road system is also exacerbated by the absence of an explicit price for vehicle use. Thus, the costs of ownership and utilisation of road transport (such as insurance, fuel, maintenance) are diverse and irregular in relation to that use. As a consequence, these costs are not precisely apparent at the point of consumption. In effect, therefore, the potential traveller perceives a zero opportunity cost of vehicle usage at this point, with no price available as a basis of comparison between modes.
shown that, under these circumstances, the subsidisation of railway infrastructure is necessary, although this is not also true of railway operating services.10 However, despite the impediment of inefficient infrastructure pricing, it is shown in this section that the market might be allowed to operate more effectively than at present by using this distinction between operating services and infrastructure.

As noted above, Thomson (1974) has argued that transport operating services and infrastructure have fundamentally different attributes, which result in infrastructure monopoly and operating service competition. Therefore, the segregation of railway operating services and infrastructure might be pursued with the aim of promoting the use of market forces where competitive pressures exist. Indeed, while Thomson's argument is framed as applying to transport, generally, he also made specific reference to the railways. Thus, he has argued that (op.cit., p.247),

10 Unless some other reason for their subsidisation is advanced. Such possibilities and their merits, are discussed in chapter 5, which examines the appropriateness of the 'social profit' objective for British Rail.
"...the integrated ownership (emphasis added) of railway infrastructure and operating services has blurred the important economic distinction between the two sides of the transport industry. The need for a more commercial and competitive approach to the operation of rail services should not obscure the quite separate problems of the railway infrastructure. There is, as there always has been, a case for separate ownership and financing of the infrastructure."

However, the very fact that there is an integrated ownership of railway infrastructure and operating service inhibits the direct testing of Thomson's arguments on the railways. Therefore, the strength of his analysis is explored on three levels:

11 Thus, a similar proposal was made by Chadwick (1859), who favoured a restructuring of the railways, in which the Government would own them and entrepreneurs would be invited to bid for a franchise to operate them. Galt, a contemporary of Chadwick, also supported such a scheme in his evidence to the Royal Commission on the Railways, in which he advocated state ownership of the railways and the operation of rail services by privately owned companies under licence (Royal Commission on Railways, 1867, Minutes of Evidence, Vol.1, Galt, pp.331-324). However, it appears that Galt was influenced by Chadwick (Ekelund and Price, 1979, p.255). Indeed, in his earlier work (Galt, 1865), Galt had considered a Chadwick-type of scheme and rejected it in favour of an arrangement whereby the railways would have been both owned and managed by Government (pp.217-219). However, while the Chadwick and Thomson schemes can be seen to be similar in that both desired the maintenance of competitive pressures in the railway industry, and this was to be achieved in both cases by restructuring the industry, Chadwick's 'bidding' proposal represents a substantive difference between them. This aspect of Chadwick's work has attracted both modern proponents (Demsetz, 1968) and opponents (Telser, 1969, 1971; Crain and Ekelund, 1976). It is seen on the one hand as a means of reducing the need for regulation of natural monopoly (Demsetz, op.cit.) and, on the other, as failing to permit the efficient allocation of resources by working against marginal cost pricing (Telser, op.cit.) and involving more subtle forms of regulation than employed at present (Crain and Ekelund, op.cit.). However, this aspect of Chadwick's approach is not essential to the present discussion. It represents one possible, but not a necessary, means of organising profitable railway operating services.
(i) an a priori assessment of its rationale  
(ii) examination of available evidence on the attributes identified in (i) above  
(iii) consideration of evidence on existing market structures.  
In all of these stages, the generality of Thomson's dichotomy between infrastructure and operating services is assessed, with a view to thereby inferring its applicability to railways. There are, however, institutional constraints on the assessments at parts (ii) and (iii). Nevertheless, on balance, it is shown below that the dichotomy between infrastructure and operating services holds and, on this basis, there is further support for a reconstruction of the railways, in which these aspects of its services are segregated.

(i) The rationale of the infrastructure: operating service dichotomy  
An a priori assessment of Thomson's views supports the distinction which he makes between the two aspects of transport. This can be demonstrated by considering the case of an infrastructure company and an operating service, each of which has a single asset. If the attributes assigned to the respective aspects of transport systems by Thomson are taken as given, the following situation holds.

The indivisible nature of the infrastructure asset means the potential investor has to decide, by and large, whether to have such an asset or not. In the case of the operating services, the range of possible operational units available is such that the 'have/have not' decision is amenable to relatively precise gradations from one alternative to the next. If a high initial capital cost is added to the 'have/have not'
decision of the infrastructure asset, this might constitute an entry barrier which is absent in the case of the operating service, in which a greater choice over the type of asset is said to be combined with a relatively smaller capital cost. Furthermore, the very specific nature of the infrastructure assets makes them almost exclusively useful for a single purpose; whereas many alternative uses might be found for the principal asset of an operating service. Thus a high opportunity cost of the investment to be made in infrastructure must be added to the high capital outlays to reinforce barriers to entry; the opposite of the case for operating services.

If these characteristics of infrastructure assets create a barrier to entry, their other attributes are likely to perpetuate this. While, in general, Thomson suggests that the operating services do not have significant economies of scale, it appears that infrastructure does. Thus, while the operator might earn a normal return in a competitive market, the provider of infrastructure might earn excess profits because of lower operating costs and, indeed, the existence of scale economies might also deter entrants. Also, the sheer longevity of the infrastructure asset means the benefits of entry barriers might be reaped for many years without needing to replace the principal asset of the business. By comparison, the wide choice of relatively cheap operating service assets which are quickly consumed would appear to promote competitive pressures in that aspect of transport systems.
Overall, therefore, the rationale is consistent with Thomson's dichotomy. On this basis, there is a case for the segregation of the infrastructure and operating services of the railways (in common with all other modes). However, this simplified set of relationships made two important assumptions: (a) that the characteristics of principal assets (as specified by Thomson) could be taken as given and (b) that transport systems are free to respond to market pressures. Assumption (a) is relaxed in the following section (part (ii)), which considers evidence on the differences between the principal assets of infrastructure and operating services; assumption (b) is relaxed in part (iii), in which the influence of market pressures is examined.

(ii) **Fundamental attributes of infrastructure and operating service assets**

The previous section identified four attributes which distinguished the principal assets of the two aspects of transport systems, as set out in table 2.1. This section analyses the extent to which there is such a sharp divide between their principal assets, in two parts:

(a) A preliminary comparison, which examines the relatively non-controversial attributes (numbers 1 to 3 in table 2.1),

(b) a discussion of the existence or otherwise of economies of scale.
Table 2.1  A Comparison of the Attributes of the Principal Assets of Transport Systems

<table>
<thead>
<tr>
<th>Asset Attribute</th>
<th>Infrastructure</th>
<th>Operating Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Technical Divisibility</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>(2) Asset Lives</td>
<td>Long</td>
<td>Short</td>
</tr>
<tr>
<td>(3) Capital Costs</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>(4) Economies of Scale</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

This evidence points to the validity of the infrastructure: operating services dichotomy, but does not offer unqualified support for this distinction.

(a) Fundamental attributes of capital assets - a preliminary comparison:

It is shown below that, for (1) technical indivisibilities, (2) asset lives and (3) capital costs, there are sharp differences between the assets of railway infrastructure and operating services as, indeed, there are for both aspects of all modes. This is further necessary (but not sufficient) evidence supporting the segregation of British Rail to bring it into line with other modes. Each of these non-controversial attributes is considered, in turn, below.
(1) Technical indivisibilities

As regards technical indivisibility, in which there is a technical limit on the size of projects, its existence is evident in transport infrastructure. Examples of infrastructure capital projects which require investment in complete units include the construction of a new airport, a new railway station, a new port or a new motorway. Similarly, capital improvements of existing systems of the infrastructure exhibit this indivisible attribute, for example, main line electrification of the railways or the provision of deep-water facilities at ports to accommodate larger ships.

It might appear possible to alleviate the indivisible nature of such investments by adjusting their scale: a shorter stretch of railway electrification or motorway; a smaller airport or deep-water facility. However, technical barriers will set a lower limit on the extent to which this can be achieved. For example, there must be at least one line of track to have a railway system. Similarly, there need be no more than a single lane road as a basic minimum. As for fixed installations, such as docks and airports, similar lower limits might be set: a single berth and quayside, an airport

12 Although the nature of the 'port' could be very different from the conventional one. Thus, single point mooring buoys, which are connected by pipeline to the mainland, can dispense with the need for conventional ports or additional jetties for particular cargoes. These are presently in use at Anglesey, for petroleum, and in New Zealand, for slurried iron sand (National Ports Council, 1976, pp.3 and 5).
building and a single railway. Furthermore, there is a stepwise rather than a continuous movement from this basic minimum to the next option: two-way railway track; roads with two lanes; additional berths in docks and additional runways at airports.  

This also applies to the types of capital improvements mentioned above. For example, main line electrification of a complete route from cities A to F can be set at a basic minimum over the initial stage of the route from city A to city B and extended over the route in indivisible lumps.  

Also, the provision of deep-water facilities is constrained by the draught and size (as measured by beam and length) of the classes of ship expected to use the port facilities and the physical possibilities for expansion at a given port.  

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13 In the case of airports it has been argued that, while it might be possible for an established airport to attempt to mollify the impact of indivisibilities by, for example, providing "taxiways, fast turn-offs, different patterns of runway usage, and the provision of a short runway for light aircraft.....", the basic pattern of discontinuities in airport capacity remains, (Walters, 1978, p.136).

14 This is exemplified by the electrification of the West Coast route to Glasgow from London. The stretch from London to Birmingham might be seen as a basic minimum with additional segments to Crewe; Preston and then to Glasgow. This is necessarily so because the trains constructed for electrified lines could not operate over traditional track, therefore, the basic length of initial electrification and the extensions of this are bound by the location of the next sizeable halt where diesel locomotives could replace those powered by electricity.

15 See for example, Hunter, E. and T.B. Wilson's (1969) study, particularly at pp.191-192 and Tables 7 (p.207) and 8 (pp.208-210), which sets out such limits for British ports.
At first sight, technical indivisibilities appear to apply in the operating services, as well. In acquiring additional operating equipment or in the provision of existing services, it might be argued that incremental adjustments can only be made in discrete stages. However, the nature of these adjustments differs from that of infrastructure. This is primarily because of the range of different vehicles within each mode. The single decker bus is 'half a bus', with even smaller sizes possible. This also applies to trucks, aircraft, ships and locomotives. It is possible to acquire different sizes for all of these which smooth out the indivisibilities.\footnote{For example, in relation to aircraft, Reid and Allen (1970, p.157) note the availability of aircraft which have been designed specifically for different routes. This is an attribute which influences airlines in their capital investment decisions (British Airways, 1979, p.14).} Also, in commercial firms, the transport unit might be regarded as a fleet, whether of cars, taxis, buses, trucks, locomotives, aircraft or ships. In this case, the acquisition of one new vehicle or locomotive is not a lumpy increase, bearing in mind the small size of such additions relative to the total fleet.\footnote{An indication of the impact of a single additional vehicle to a fleet can be seen from the sizes of the fleets of major operators, e.g. British Rail - 3,571 locomotives; 16,627 passenger carriages; 137,589 freight carriages; National Bus - 15,586 vehicles; British Airways - 183 aircraft; 28 helicopters; Ocean Transport and Trading 668 ships of various kinds (source - 1980 Annual Reports).} Also, in using existing fleets, incremental adjustments to capacity can be made. This is most evident in the case of the railways, by hitching or unhitching carriages or by running additional relief trains at peak times. Similar adjustments can be made for the other
operating services with, for example, timetabling and scheduling of small and large buses or aircraft to meet uneven demands, with relief buses and standby aircraft at peak periods of travel.

(2) Asset lives

This sharp divide between the two types of assets as regards their divisibility is also apparent in respect of their longevity. This can be seen from table 2.2, which shows the estimated useful lives of assets of the principal categories of transport, for both the operating services and infrastructure of all modes. These figures, with one exception (i.e. roads), have been derived from the annual accounts of corporations, from both the public and private sectors. Therefore, they do not represent actual useful lives, but rather those which have been selected as prudent for the purposes of the preparation of annual accounts. Nevertheless, the influences of conservatism apply to both types of asset, infrastructure and operational, and to this extent these estimates retain their usefulness. Indeed, there appears to be only one slight inconsistency which might be attributed to the uneven operation of conservative influences and that is buildings. The table shows that, whereas airport buildings have useful lives of 20 years, this is doubled in the case of station buildings and increased to 50 years in the case of port buildings.

However, despite such reservations, it is important to note that the evidence presented in this table does support the
<table>
<thead>
<tr>
<th>Mode</th>
<th>Infrastructure</th>
<th>Operating Services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Description</td>
<td>Life (Years)</td>
</tr>
<tr>
<td>Air</td>
<td>Airport Buildings</td>
<td>20(^1)</td>
</tr>
<tr>
<td></td>
<td>Runways, Aprons and Taxiways</td>
<td>15-25(^1)</td>
</tr>
<tr>
<td>Rail</td>
<td>Electrification schemes, track works, all fixed installations</td>
<td>40(^3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>Foundations</td>
<td>25-50(^4)</td>
</tr>
<tr>
<td></td>
<td>Bridges, tunnels surfaces</td>
<td>50-100(^6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-35</td>
</tr>
<tr>
<td>Sea</td>
<td>Site preparation, dredging, dock structures and buildings</td>
<td>50(^7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 British Airports Authority  
2 British Airways  
3 British Rail  
4 Georgi, Cost-Benefit Analysis, Butterworths, 1973  
5 National Bus Company  
6 National Freight Corporation  
7 British Transport Docks Board  
8 These estimates are derived from the Annual Reports and Accounts of P & O, Christian Salvesen, Ellerman Lines and Ocean Transport and Trading
proposition that infrastructure assets are exceptionally long-lived relative to those of the operational side of the transport services. Indeed, these assets generally prove to be at least twice as long-lived as those of the operating services.\(^{18}\)

(3) Capital costs

A further attribute of transport assets which was said to distinguish the principal assets of operating services and infrastructure was that of cost. Thus, it was suggested that the acquisition cost of infrastructure assets might prove a barrier to entry, but that (low) operating service capital costs would allow new firms to enter the industry. Furthermore, it was suggested that such a barrier to entry for infrastructure would be reinforced by a high opportunity cost which attached to its capital assets, but which was not applicable to operating service assets.

Evidence in support of such a distinction is contained in table 2.3. This sets out the capital costs (at 1979 levels) of individual items within both aspects of transport provision. By necessity, the examination of this attribute is largely confined to specific items. This is because the capital costs of transport

\(^{18}\) However, the longevity of infrastructure assets is not unique. Consider, for example, the estimated useful lives of property (in years, in brackets) for the following companies: B.L. (40); Unilever (33-40); General Electric (25-50); I.C.I. (23); R.T.Z. (20); Esso (50); B.P. (25). (Source: Annual Reports and Accounts. Compiled from 'Top Ten Capital Employed' in Times 1,000).
Table 2.3  Capital Costs of Individual Transport Assets*

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
<th>Cost</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Air</td>
<td>£1,346m</td>
<td>(a) Boeing 747</td>
<td>£32m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(b) Boeing 757</td>
<td>£20m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(c) Tri-star</td>
<td>£19m</td>
</tr>
<tr>
<td>2.</td>
<td>Rail</td>
<td></td>
<td>(a) Main Line Electrification</td>
<td>£292-918m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(b) New Track</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(23.5 km)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Road</td>
<td></td>
<td>(a) Motorway</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 90 miles</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(b) Dual Carriageway</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 80 miles</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Sea</td>
<td>£136m</td>
<td>Tanker</td>
<td>£20m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(b) 4 oil jetties</td>
<td>£45m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(c) 1 container berth</td>
<td>£15m</td>
</tr>
</tbody>
</table>

* all at 1979 costs; all rounded to the nearest £'000 or £m, sources: as disclosed in footnotes
assets are not available in an infrastructure: operating services' classification, given the disparate ownership of, and, indeed different methods of financial reporting on, such assets. Overall, a contrast in capital costs between infrastructure and operating services is evident, and this is most marked for road and rail.

Thus the cost of purchasing a modern passenger aircraft at some £19-32 million\textsuperscript{19} is dwarfed by the cost of acquiring a major airport which could service such aircraft, at some £1346 million.\textsuperscript{20} As regards rail, even the most expensive rolling stock, the high speed train, at an excess of £2 million,\textsuperscript{21} is significantly less than a major infrastructure project, such as the electrification of

\textsuperscript{19} These estimates were obtained from B.A.'s Annual Report and Accounts for 1979, in which its capital expenditure commitments for various types of aircraft, and the number on order, are set out. These were as follows: Boeing 747s (3) at £94.9 million; Boeing 757s (19) at £38.2 million; Tri-stars (8) at £14.8 million.

\textsuperscript{20} This refers to the estimated cost of constructing a third London airport at Maplin. It is based on the July 1975 cost of £650m announced by the Secretary of State for the Environment when it was confirmed that this project was finally rejected (BAA Annual Report and Accounts, 1974-75, p.41). This estimate has been updated by the use of the current cost index for the construction of public buildings and works, other than housing.

\textsuperscript{21} The estimated acquisition cost of a high speed train is based on the purchase of 14 high speed trains (i.e. 2 power cars plus 8 passenger carriages, per train) at £30,082,000 as disclosed in British Rail's Annual Report and Accounts, 1979. Of the other costs set out in table 2.3, the diesel locomotive figure is the average cost of manufacturing such locomotives in the U.K., as at the 1979 year end (Business Monitor, Quarterly Statistics, PO 384, 'Locomotives, Railway Track Equipment, Railway Carriages, Wagons and Trams', 2nd Quarter, 1980). The estimated cost of a passenger coach is based on a British Rail announcement (Times, December 1979) that it required £300 million to purchase 2,000 passenger coaches to modernise its fleet.
inter-city routes which, dependent on the actual scheme implemented, might range from a lower limit of £292 million to a higher one of £918 million.\(^{22}\) Similarly, the purchase of road vehicles, such as a truck at £23,395\(^{23}\) or a coach at £47,676\(^{24}\) is substantially less than that of constructing a stretch of road at some £3m per mile for motorway and in excess of £2m per mile for dual carriageway.\(^{25}\)

However, the gap between the capital costs of operating assets and infrastructure assets in sea transport, as shown in table 2.3, is far narrower than that of the other modes. This is particularly true of the comparison of the medium-sized tanker at £20m\(^{26}\) with segments of ports, such as a container berth at £15m\(^{27}\) or oil jetties at...
£45m,\textsuperscript{28} but it also applies to its comparison with the construction of a major new port at a cost of some £136m.\textsuperscript{29}

Furthermore, it was suggested above that the opportunity cost of infrastructure assets is high relative to those of the operating services, and this might therefore reinforce any barrier to entry created by the high acquisition costs of such assets. Thus the opportunity cost of investing in an infrastructure asset, which is likely to be both indivisible and entail a high acquisition cost, will be greater than that of investing in a divisible capital asset with a relatively low acquisition cost, such as those of the operating services. Thus, as argued above, operating service assets (primarily vehicles) are likely to have a greater number of alternative uses within the organisation which possesses them (for example, by the transfer of locomotives from passenger to freight traffic, or from one geographical region to another) or might be of use to an alternative organisation (hence the active second-hand market in road vehicles, ships and aircraft). This contrasts with infrastructure

\textsuperscript{28} The reported cost of 4 jetties, completed in 1979, at Sullom Voe in the Shetlands, to handle oil traffic (Scotsman, 22nd September, 1980). This compares with an estimated cost of £29.5 million for 3 jetties in 1975-76 (National Ports Council, Annual Reports and Accounts, 1975, p.7: 1976, p.9).

\textsuperscript{29} The £136 million refers to the estimated cost of constructing a completely new deep water general cargo port at Portbury, near Bristol. This port was proposed as a specialist one for the handling of container traffic, with 9 berths, at an estimated cost of £3 million each, in 1964, but was rejected by the Minister of Transport. This estimate was uplifted by the cost of new construction index to 1970 price levels and then the resultant sum was linked to the index for the construction of public works and buildings, other than housing, which is only available from 1970.
assets such as roads, railway track, airports and seaports which are of a very specific nature and, therefore, offer limited opportunities for alternative uses, unless their disposal for scrap.

Therefore, ceteris paribus, it might be expected that the difference between capital outlays and disposal values of operating service assets will be significantly less than those of the infrastructure. In terms of relative capital costs, therefore, the infrastructure would have both high costs of entry and of exit serving as barriers to new firms, whereas the operating services would have both ease of entry and exit, without incurring heavy costs.

(b) Fundamental attributes of capital assets - economies of scale:

The previous section highlighted the non-controversial differences between the principal assets of infrastructure and operating services, thereby offering necessary, but not conclusive, evidence in support of the fundamental distinction between the two aspects of transport systems, and the segregation of railways. A further aspect of this distinction made by Thomson, and supported in the a priori analysis, was that of the existence (infrastructure) or absence (operating services) of economies of scale. Thus it was suggested that, on the one hand, the monopoly tendencies in infrastructure would be perpetuated by economies of scale and, on the other, that the absence of economies of scale in the operating services would promote competitive pressures.
The demonstration that such a dichotomy holds for railways, in common with all other modes, would lend further support to their segregation. However, there are a number of difficulties in determining whether such a dichotomy exists. In the first instance, all studies of whether or not the railways exhibit economies of scale have been made of entire railway systems, not a separate infrastructure and operating service. Also, the issue of economies of scale in transport has primarily been one relating to the operating services and there has been a corresponding neglect of infrastructure, particularly seaports and airports. Furthermore, since there is no commercial operation of the road system it is not possible to measure operational economies of scale for the roads, although there is limited evidence available on economies of scale in road construction. As a consequence of this, the evidence relating to economies of scale is assessed in three stages:

(1) Operating Services: Road, Air and Sea,
(2) Infrastructure: Road, Air and Sea,
(3) Railways.

On the basis of this three-stage analysis it is possible to detect sufficient evidence which suggests that there are no significant economies of scale within the operating services and that they are most likely to be found in infrastructure. This lends further support to the segregation of railway systems to bring them into line with the other modes.
(1) Operating services: road, air and sea

The empirical evidence on the existence or otherwise of economies of scale in the operating services of road, air and sea is summarised in table 2.4. This shows that Thomson's viewpoint that there are no significant economies of scale in the transport operating services is by no means unanimous.

Thus, in the road haulage industry, Walters (1961) has cited the existence of large firms dominating milk haulage in the U.K. as presumptive evidence of economies of scale. Also, Ladenson and Stoya (1974), in an investigation of the U.S. trucking industry, reported increases in the ratio of output to labour employed which were rising faster than increases in numbers employed (i.e. their measure of size). They concluded that there was even greater scope for economies of scale in this industry.

In the road passenger industry, an early report by the Prices and Incomes Board (1966) stated that the introduction of one man buses (by reducing operating costs and increasing the size of buses) offered potential scale economies.

Also, in the airline industry, it has been suggested that there are economies of scale in the support systems (administrative expenditure, passenger services and ground operations, including reservations) required by passenger airline operations (Meyer et al. 1959). It has also been suggested that there are economies of scale associated with the attributes of individual aircraft and fleets of aircraft. For example, in the case of individual aircraft
Table 2.4  A Summary of Evidence on Economies of Scale in Operating Services for Road, Air and Sea

<table>
<thead>
<tr>
<th>1. Road Haulage</th>
<th>2. Road Passenger</th>
<th>3. Air</th>
<th>4. Shipping</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Evidence in favour of economies of scale</td>
<td>(b) Evidence against economies of scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thomson and Hunter (1973)</td>
<td>Metaxas (1971)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Heaver and Studer (1972)</td>
</tr>
<tr>
<td>Bayliss (1971)</td>
<td>Thomson and Hunter (1973)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thomson and Hunter (1973)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koenker (1977)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
it has been suggested that a doubling of size (holding other design aspects constant) would reduce seat operating costs by 15 percent (S.C.N.I., 1967). Also, as regards fleets of aircraft, there are said to be potential economies in standardising the aircraft used. This includes reduced costs by holding fewer spares, lower maintenance and overhaul costs, lower training costs for flight crew and ground staff and a lower standby aircraft requirement (Edwards Report, 1969). This latter viewpoint is supported by Thomson and Hunter (1973).

Furthermore, in the shipping industry, it has been suggested that there are considerable economies of scale, as regards both acquisition costs and operating costs, to be obtained by the use of large bulk carriers and tankers (Cufley, 1963; Heaver 1970; Metaxas, 1971; Heaver and Studer, 1972).

Nevertheless, all of this must be placed in perspective. As shown below, there is sufficient counter-evidence to rebut the case for scale economies in the operating services of most industries, or at least to cast serious doubts over their existence in the specific cases where available evidence is not conclusive.

In the road haulage industry, for example, Walters' (op.cit.) claims were made, partly on the basis of an erroneous understanding of the specialist milk haulage industry, partly on a misunderstanding of the nature of scale economies in road haulage. Thus, Chisholm (1959, 1961) demonstrated that, if anything, there were slight diseconomies of scale and that the existence of large firms could be attributed to the Milk Marketing Board licensing local monopolies -
not market pressures. Also, the answer to the Walters paradox of large scale firms in an apparently competitive market was provided in studies by Bayliss (1971) and Bayliss and Edwards (1971), in which it was shown that different sizes of firm serve different market segments, but at constant returns to scale for the different operators. Their crucial distinction in explaining the existence of constant returns to scale is that, while on the one hand, there are considerable economies of scale in relation to vehicle size (and, indeed, larger firms tend to have larger vehicles), these economies do not extend to the firms. In part, this is explained by the smaller firms increasing the size of their vehicles, as the existence of changes in technology has not prevented the smaller firms taking advantage of them. It is also indicative of organisational and operational diseconomies in large scale firms which offset the economies of scale of individual vehicles.

This latter aspect of these studies is confirmed by Reid and Allen's (1970) examination of the major operator, British Road Services (now National Freight Corporation), in which they showed that, while its operating costs were some 80 percent of the rest of the industry, its fixed costs were almost twice, and sometimes four times those of the rest of the industry. In addition, this corporation attempted to counteract the inherent flexibility of its smaller competitors by decentralising its operations, a policy adopted by other major hauliers, which is indicative of possible diseconomies of scale (Thomson and Hunter, 1973).
Furthermore, the weight of evidence in overseas studies suggests that there are no substantive economies of scale in road freight. The evidence of Ladenson and Stoya (op.cit.) is doubtful, as they failed to take account of average hauls and loads in their study. The heavier loads and longer hauls of large firms, coupled with less labour required for such trips, do not constitute a scale effect. Such changes in the nature of freight were isolated by Roberts (1956) and Nelson (1959) in two well known studies which reported constant returns to scale in U.S. trucking. More recent evidence (Koenker, 1977) substantiates these earlier findings of constant returns to scale. Koenker also found that, as the average length of haul and the weight of load were increased, the average costs of transporting a ton-mile of freight did fall dramatically, but these characteristics of freight carried (i.e. weight and distance taken) were correlated with large firms operating in these particular market segments (c.f. Bayliss). In general, therefore, there is little evidence of economies of scale in road haulage.

In the road passenger transport industry, the claim by the Prices and Incomes Board (op.cit.) that one-man operated buses were a major potential source of economies of scale was misplaced. Rhys (1972) comprehensively demonstrated that additional costs were created by one-man operation which worked against possible cost savings from lower labour requirements and greater passenger carrying capacity. These additional costs were largely caused by the technologically more complex buses required for one-man bus operation. These rear tranverse-engined buses consumed components
more quickly than conventional buses, incurred greater maintenance costs, experienced more breakdowns and had shorter working lives (Rhys, op.cit.). An analysis of the financial results of municipal bus operators from 1965 to 1969 by Brown and Nash (1972) also revealed that economies of one-man operation were modest. Indeed, as Lee and Steedman (1970) found in an investigation of U.K. municipal bus operation, constant returns to scale was the norm. Thus, they found that nearly 80 percent of the variation in total working expenses per bus-mile (in 1967) was explained by three variables: the price of labour; labour input per bus-mile and fuel consumption. There was no evidence of a significant scale effect with any of these explanatory variables.

Overseas studies of Indian (Koshal, 1970) and U.S. (Koshal, 1972) bus operators also reported constant returns to scale. There is, however, some evidence of diseconomies of scale in bus operation. Thus, Wabe and Cole (1975), in a replication of the Lee-Steedman study, reported increasing costs of bus operation by large operators. But this study did not eliminate the influence of technological change on costs, as highlighted by Rhys (op.cit.) and its results should be interpreted with caution. Furthermore, these studies have concentrated on the effects of scale on operating costs. However, Thomson and Hunter (1973) suggest that, if there are any such economies of scale, they seem to be exhausted fairly quickly by managerial diseconomies. They cite the example of W. Alexander & Son, one of the largest companies in the Scottish bus group, which was split into three separate companies serving
different geographical areas in 1961, in the interests of efficiency. In sum, it seems that there are almost certainly no scale economies in bus operation, although the possibility of diseconomies does exist.

Similarly, within the airline industry, the claims of the few proponents of economies of scale are somewhat overstated. The first of these is related to the support systems required by passenger airline operations (Meyer et al., op.cit.). However, not only are its proponents of the view that such 'scale economies' are likely to be slight, but it is also arguable that the cost of providing such support services is a diseconomy of scale. Thus the necessity of providing sophisticated support systems is likely to be greater for large scale firms servicing inter-continental and intra-European air transport than for smaller firms supplying local or regional services.

Also, the significance of alleged scale economies for individual (S.C.N.I., op.cit.), and fleets (Edwards op.cit., Thomson and Hunter op.cit.) of, aircraft must be examined very carefully in the light of the market to be served. The mere doubling (S.C.N.I.; op.cit.) of the size of an aircraft and an accompanying reduction of costs need not be evidence of a pure scale effect, but might be a consequence of the utilisation of such an aircraft in a different market segment (c.f. road haulage, above). That is, the larger aircraft offering these potential economies will tend to be utilised on long-haul flights.

There are two aspects to such economies. In the first place, given the available seat capacity, the larger aircraft might offer economies both by having lower fuel and labour costs per passenger/seat
mile and by being faster, therefore giving a quicker turnaround and greater utilisation. This is not a scale economy, unless the larger aircraft might equally be used on short-haul flights; this is discussed further below. Secondly, larger aircraft are designed with longer ranges of operation in mind, and if this reduces the number of landings made or increases the distance between landings compared to short-haul operations, the previous category of cost savings will be spread even further per passenger/seat mile before landing costs are incurred. Again, this is not a scale economy, but a function of the type of market served.

Also, the route density or possible load factor available is of vital importance in assessing the costs of different operations. If guaranteed high loads are available and larger aircraft can be employed, then scale economies might be realised. However, the potential for high load factors is erratic. Within the U.K. internal air services this potential is confined to the major trunk routes, but is inhibited not only by possible levels of demand, but also by the technical indivisibility of runway size. As for international scheduled services, there exists an overall excess capacity, which has lasted many years. This can be partly attributed to many countries insistence on having a national airline, regardless of its financial viability (Straszheim, 1978). There are, however, higher load factors in charter services (Smithies, 1973). However, the route densities available on such flights exhibit short-lived seasonal peaks (Doganis, 1973). This means that the higher load factors attainable have to more than compensate for the larger part
of the year when a fleet maintained for such operations would be underutilised, or inoperative, if any scale economies are to be realised.

Furthermore, airlines frequently operate in all segments of the market and do not standardise aircraft to the extent suggested in the Edwards Report (op.cit.). Thus, it is instructive to note that B.A.'s planned 'ideal' fleet is based on no fewer than six different types of aircraft with a total fleet size of 180-200 aircraft, all carefully selected to synchronise their operating costs and capacities over specific flight ranges, (B.A. 1979, p.14).

As regards overseas studies, Eads et al. (1969) have suggested that only modest economies of scale are available to operators in the U.S.

In the shipping industry, the evidence in support of the existence of scale economies relates to the oil shipment and bulk carrier trades (Cufley, Heaver, Metaxas, Heaver and Studer - table 2.4). This specifies that economies of scale exist for the acquisition and operating costs of such vessels. However, there are significant limitations which must be placed on these results. In the first instance, this evidence was gathered before the 1973 oil price increases, which could have greatly influenced the operating costs of the larger, faster vessels. Also, it is generally held that

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30 Thus, in recent years, these faster, larger vessels have been instructed to engage in 'slow steaming' to save costs. The costs saved are partly fuel and partly the costs of spending too long in port, while waiting for another cargo (see B.P. Annual Reports and Accounts, 1977, p.5).
larger ships spend longer in port. Therefore, cost savings gained in operating such vessels might be offset by the additional costs incurred in having such vessels tied up in port for longer periods.

There is some evidence (Heaver and Studer 1972) that cargo loading costs actually decline with increases in the size of vessels, despite the fact that the larger vessels spent a longer time in port. This was achieved by higher loading rates for larger vessels. However, the general applicability of this finding is dubious: it deals with a specialised cargo (grain), in one port (Vancouver) and the results only applied to vessels of 35,000 deadweight tonnage and less. Furthermore, the size of such scale economies as exist in these trades cannot be substantial, as no single shipping firm or country has dominated either oil transhipment or the carriage of goods by bulk carrier (Metaxas, op.cit.; O.E.C.D., 1977).

In any event, the existence of economies of scale in shipping, such as they are, appear to be confined to bulk carriers and oil tankers. In the cargo trades, a repeated finding is that of constant returns to scale. The first major study in this area was that by Ferguson et al. (1961). This investigated liner company costs as a function of company size of specific trade routes. Ferguson et al. found constant returns to scale over a wide range of firm sizes. Also, a study by Saggar (1970) of the U.K.-India deep-sea general cargo route supported the view that there were no
economies of scale in shipping. He examined the turnaround and costs of conventional cargo liners, and found that simply increasing the size of such ships did not reduce costs. However, the development of the cellular container ship and its rapid adoption in the 1960s and 1970s was based on the premise that substantial economies of scale were available in this type of shipping. In a study of U.K. deep sea general cargo shipping in the 1970s, Laing (1975) examined both general and container vessels. This showed that the container ships initially provided economies of scale, because the increased rate at which cargo was loaded and discharged meant container ships spent less time in port. This was followed by increases in the size of container ships. However, by the mid-70s, Laing discovered that the time spent in port by these ships was comparable to conventional ships and this, in conjunction with higher operating costs of these larger vessels, dissipated initial economies of scale.

(2) Infrastructure: road, air and sea

The previous section supported Thomson's view that there are no significant economies of scale in transport operating services. In this section, the existence or otherwise of economies of scale in non-rail infrastructure is examined to determine whether the fundamental dichotomy between infrastructure and operating services is upheld, thereby supporting the segregation of the railways. Each of the non-rail aspects of transport infrastructure, road, air and sea, is assessed, in turn.
The existence or otherwise of economies of scale in roads is obviously constrained by their non-commercial operation. However, there is evidence that scale economies do exist in the provision of roads. Thus Walters (1968, p.185) reported that there was a sharp discontinuity in the cost of road improvements: the costs of expanding a two lane highway to a three lane one were some 50 percent more than the cost of a four lane highway. Similarly, Tanner (1968) discovered that the cost of constructing a six lane motorway was only some 28 percent higher than the construction costs of a four lane motorway.

These findings regarding roads are also pertinent in the case of airports. Thus Walters (1978, p.135) has argued that it is likely that one four-runway airport is less expensive than two two-runway airports or four one-runway airports. As regards the operation of airports, Doganis and Thompson (1975, p.336) reported on the existence of "considerable cost economies of scale up to the 1.5 million to 2.5 million passenger throughput level". However, after this output level was achieved, they found that the long run average cost curve tended to flatten out. Furthermore, while they therefore placed some limit on the size of the economies of scale available, they found that there were no diseconomies of scale on the range of output achieved by British airports.

However, Walters (op.cit., p.136) has argued that there are two such diseconomies. The first he typifies as a "natural diseconomy", namely the progressive elimination of the most desirable
airport sites as additional airport capacity is built. While this does appear likely he offers more tangible evidence of the second diseconomy, namely that associated with terminal facilities. He cites the U.S. experience (p.136) of small airports handling passenger throughputs more quickly than large ones. Thus economies of scale associated with runways might eventually be offset by diseconomies of terminal operation.

As regards ports, there is little substantive evidence of returns to scale. Wilder and Pender (op.cit.), while not specifically making a study of economies of scale in U.S. ports, thought that the existence of "massive economies of scale" (p.178) in the ports which they studied was most unlikely. This is confirmed by the British experience. Thus the National Ports Council (op.cit.) has intimated that, as a consequence of modern developments (such as roll-on, roll-off cargo ships, containerisation), there is a greater throughput possible and ports, in terms of effective area, are becoming progressively smaller (p.22). Also, as noted above, the preponderance of the capital intensity lies with the changes in shipping technology. Furthermore, such changes in shipping have also reduced the operational costs of ports (op.cit., p.21) while increasing output.

Therefore, a picture is presented of ports of relatively smaller size physically and in terms of capital invested, achieving higher levels of output because of the extraneous influence of changes in shipping technology. This is consistent with limited potential economies of scale in ports.
Furthermore, the N.P.C., in specifically addressing the size of Rotterdam relative to U.K. ports, point to the extensive hinterland it serves in Europe. Thus port size is a function of the demands made upon it. Well developed transport systems in the hinterland mitigate against the development of massive large scale ports unless they occupy strategic locations for servicing exceptional demands (c.f. Wilder and Pender re competition in U.S. ports).

Overall, therefore, it appears that there are economies of scale in non-rail transport infrastructure. Both roads and airports have scale economies, although the latter's might not be substantive. However, the evidence regarding ports suggests that, in general, only modest economies of scale might be expected, unless geographical circumstances favour a particular port.

(3) Railways

The issue of whether there are or are not economies of scale in railway operation has proved contentious, but the distinction between the operating services and infrastructure sheds light on ambiguities in such studies and consequent differences of opinion. For example, it has been argued that the claim that railways have economies of scale is a "traditional railways prejudice" (Foster, 1975, p.94), which has no basis in fact. In Foster's view, such scale economies are "bogus .... as they exist because the railways had, and have, more assets than they need at actual output levels"
(op. cit., p. 94). He further asserts that available empirical evidence suggests that the railways can be regarded as a constant returns to scale industry.

However, as noted above, a qualification to any comment regarding existing, and past, levels of railway output is the lack of a system of road pricing. Therefore, it might be argued that, if such a pricing system was in operation there might be a transfer of traffic from road to rail such that the "bogus" scale economies of railways alleged by Foster might actually be achieved. Indeed, given the absence of road pricing, it is impossible to make categorical statements regarding the attainability or otherwise of railway scale economies.

Notwithstanding this fundamental reservation over Foster's assertions, it is important to note the nature of the empirical evidence on which he draws. This is based on studies by Borts (1952 and 1960), Klein (1953) and Griliches (1972) in the U.S. and Joy's (1964) study in the U.K. All of these studies suggest that a very high proportion of railway costs (including track costs) are variable, thereby reducing the potential for decreasing costs as output expands. Thus, Borts reported variability of costs at 94 percent (1952) and a range of somewhat inconclusive results for the Eastern, Southern and Western regions of the U.S. (1960); Klein (1953) reported 90 percent of total costs as being variable; Griliches' estimate for all railroads was 95 percent. Therefore, the evidence cited by Foster is not consistent with constant returns to scale.
None of these studies demonstrated that all railroad costs are variable. Indeed, all of them therefore suggested the existence of a limited potential for economies of scale.

Also, in the Griliches study, which Foster (op.cit., p.94) cites as "the most careful study" of them all, it is important to note the detail of his actual conclusions and the qualifications which he makes regarding them. The Griliches study represents a critical review of the general methods of cost estimation employed by the Cost Section of the Interstate Commerce Commission and their particular finding that 80 percent of railroad costs are variable, thereby implying substantial possible economies of scale.

The major reservation expressed by Griliches over the I.C.C. methodology was its choice of railroad miles as a deflator in its regression analysis (Griliches, op.cit., p.31). In his view, more appropriate means could have been employed to minimise the influence of extremely large observations on the regression analysis and he specifically advocated a logarithmic transformation (op.cit., p.33). However, it is interesting to note that the use of this procedure vindicates the I.C.C., as Griliches reported variability of costs at 82.3 percent (all railroads), 60.3 percent (small railroads) and 90.4 percent (large railroads). Indeed, it is only his undeflated results which provide grounds for suggesting what is virtually constant

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31 A related criticism made by Griliches, that 'railroad miles' is an inappropriate 'size' deflator is unwarranted. The alternative of track miles in unrelated to the route system, the critical element in determining the size of railroads (see Harris, 1977, p.558). Furthermore, as Harris' (op.cit., p.558) notes, Griliches uses these terms interchangeably, as if they constitute one and the same thing.
returns to scale for large firms (99.1 percent variable costs), with potential scale economies for small firms (70.3 percent variable costs).

However, Griliches even goes on to severely qualify these results. Thus he notes the shaky assumption made by his, and previous studies, that there will be proportionate increases in the different types of merchandise carried throughout the relevant ranges of output considered. Indeed, he specifically observed that economies of scale are most likely to be associated with disproportionate changes in traffic carried.

Furthermore, a subsequent study which pursued this point has substantiated this reservation expressed by Griliches, and the most recent evidence available also undermines the findings of the above-mentioned studies. Thus, Rao (1978), in an empirical analysis of Canadian railroad traffic, discovered constant returns to scale associated with the carriage of manufactured goods, but increasing returns to scale in the carriage of animal, mining and forest products. More important than this study, however, is that by Keeler (1974), which analysed 51 U.S. rail freight companies and made the crucial distinction between returns to scale for firm size, which were found to be constant, and for traffic density, which exhibited the potential for substantial, increasing returns.

Similarly, Harris (1977) in his empirical study of 55 U.S. freight railroads demonstrated that there were considerable economies
of scale associated with traffic density. The traffic density of railway operations assesses what happens to costs as output expands, when the route system is held constant; whereas the conventional approach utilises firm size as an explanatory variable i.e. if long run average costs decline as firm size increases, there are economies of scale. Thus, the former aspect of potential economies of scale is particularly pertinent to the railways where, if anything, the size of the route system is liable to be held constant, or reduced, rather than expanded. Therefore, economies of scale involved in high density of railway operation are most closely associated with the utilisation of railway infrastructure.

In conclusion, therefore, while much of the early evidence has suggested that there are 'constant', or insignificant, returns to scale for most railroads, more recent studies have pointed to substantial possible economies of scale in at least one aspect of railway operations, i.e. the intensive use of the infrastructure. However, such potential economies of scale might indeed be regarded as "bogus", as Foster has suggested. But this is true only in the sense that they might not actually be attainable, given the absence of a system of road pricing which would allow market forces to determine the optimal mix and usage of transport infrastructure.

32 Some 49 percent of such economies were attributed to capital costs and the maintenance of way and structures; a further 39 percent were attributed to fuel and crew wages. This latter aspect, the fixity of crew wages, suggests the need for rationalisation of train crews in the absence of high density of operations. That is, this is a variable cost which has become 'fixed' for institutional reasons.
(iii) Existing market structures

The preceding sections of this evaluation of Thomson's dichotomy between the operating services and infrastructure have upheld both its rationale and the existence of fundamental differences in the attributes of their principal assets, all of which supports his arguments that competitive pressures might be expected in the operating services and monopoly should prevail in infrastructure. If these earlier parts of this analysis were confirmed by existing market structures, then there would indeed be a conclusive case for the segregation of the railways, to bring them into line with other modes.

However, there are major obstacles to making reference to existing market structures as a means of assessing Thomson's arguments, most of which relate to interventionist policies, whether the regulation is by the Government or the industry itself. The railways themselves are a prime case of Government regulation, for example. Also, in the operating services, there is generally a substantial degree of regulation. The airlines are regulated by the Civil Aviation Authority within the U.K. and by the International Air Transport Association for other services. These regulations effect both tariffs and entry to the market. In shipping, there are 'shipping conferences', which impose self-regulation of the general cargo trade. Also, road transport (passenger and haulage) within the U.K. has been the subject of detailed regulation for many years. As regards infrastructure, the major technical difficulty rests with

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the roads. Since there is no commercial operation of the road system, the existence of "monopoly tendencies" cannot be readily substantiated.

Therefore, generalisations on the basis of existing market structures might be suspect because of the effects of such intervention. Not only might regulation have inhibited the development of competition in the operating services, but it might also have resulted in the creation of state monopolies to provide infrastructure where there is no natural monopoly. Notwithstanding these reservations regarding evidence on existing market structures, this does generally lend support to Thomson's assertions. This is discussed by examining (a) the operating services and (b) the infrastructure.

(a) Operating services: market structures

Both forms of road transport have been subject to licensing systems, of which road passenger's has been far stricter (Thomson and Hunter, 1973, pp.222, 276). This has resulted in a more competitive market structure in road haulage, with no single firm dominating the market. In road passenger services, the licensing system resulted in local and national monopolies for scheduled services and thousands of small scale

33 It might be argued that the National Freight Corporation is such a firm, but it did not evolve naturally from the pressures of the market place, it was created by nationalisation. Its experiences in its newly created form, as a denationalised corporation, will provide a better indication of its ability to 'dominate' the market, but it is premature to say if it will do so.
# The Market Structure of Road Transport Services

<table>
<thead>
<tr>
<th>Road Haulage</th>
<th>Category</th>
<th>Number of Fleet Operators</th>
<th>Number of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Vehicles</td>
<td>Number of Operators&lt;sup&gt;2&lt;/sup&gt; '000</td>
<td>Number of Operators&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>67.8</td>
<td>London Transport</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>21.6</td>
<td>Passenger Transport</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>10.3</td>
<td>Executives</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5.9</td>
<td>Municipal Operators</td>
<td>51</td>
</tr>
<tr>
<td>5</td>
<td>3.8</td>
<td>National Bus</td>
<td>37</td>
</tr>
<tr>
<td>6-10</td>
<td>8.4</td>
<td>Scottish Bus</td>
<td>7</td>
</tr>
<tr>
<td>11-20</td>
<td>4.4</td>
<td>Private Operators</td>
<td></td>
</tr>
<tr>
<td>21-30</td>
<td>1.4</td>
<td>Number of Vehicles</td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>.7</td>
<td>Under 5</td>
<td>3,678</td>
</tr>
<tr>
<td>41-50</td>
<td>.3</td>
<td>5-14</td>
<td>1,486</td>
</tr>
<tr>
<td>51-100</td>
<td>.7</td>
<td>15-24</td>
<td>241</td>
</tr>
<tr>
<td>101-200</td>
<td>.2</td>
<td>25-49</td>
<td>111</td>
</tr>
<tr>
<td>201+</td>
<td>.1</td>
<td>50 plus</td>
<td>20</td>
</tr>
<tr>
<td>All fleets</td>
<td>125.5</td>
<td>All Operators</td>
<td>5,639</td>
</tr>
</tbody>
</table>

Notes:  
1 as at 1979  
<sup>2</sup> operators with an operating centre in more than one traffic area must have one operator's licence for each area and these details refer to the number of operators licences rather than the number of operators.

Source: Transport Statistics, Great Britain.
private operators with under 25 vehicles in their fleets which provide ad hoc services (see table 2.5). However, the 1980 Transport Act has relaxed entry requirements into scheduled services and this might reasonably be expected to increase the degree of competition between the public and private sectors.34

As for air transport, the most significant development in recent years has been the deregulation of U.S. air services. This implies that air transport is competitive. Indeed, there is considerable evidence in support of this (see Olsen and Trapani (1981)). Also Jung and Fujii (1976), in a study of U.S. internal air services, found air services with trips under 500 miles were price elastic. As regards international air travel, Doganis (1973) found that, while the vast majority of international air routes were monopolies or duopolies because of I.A.T.A. agreements, the unregulated charter market behaved competitively, with prices and profit levels held down and ease of entry into, and exit from, the market. However, Cooper and Maynard (1972) showed that the prices of scheduled operators in Europe responded to the existence of substantial charter or non-scheduled competition. There is also evidence that the North Atlantic passenger services are price elastic (Smithies (1973), Mutti and Morai (1977)and Straszheim (1978)),

34 British Coachways is an example of how this might operate. This is a private consortium of road passenger operators, which offers inter-city coach services in competition with the publicly owned services at very competitive prices. See "Cold New Dawn", The Economist, October 11, 1980, Vol.227, No.7154.
although Straszheim (op. cit.) found that first class travel was price inelastic. All of this points to a competitive market structure in (unregulated) air transport. However, in the U.K., entry into the domestic market is tightly controlled (Department of Trade, 1976) as is the pricing policy of existing operators (C.A.A., 1979).

In the shipping industry, there is also evidence of competition. Thus, Metaxas (1971) has shown that tramp shipping exhibits a close correspondence to a perfectly competitive market. Indeed, Bonavia (1954) sets out the persistent failures of the attempts at self-regulation of this branch of shipping because of its inherently competitive nature. Also, despite the vertically integrated nature of the oil market (with the same companies frequently possessing petroleum reserves, tanker fleets, refineries and distribution channels), the oil companies have not dominated the transhipment of oil.\footnote{This suggests that entry to this market is not inhibited.}

However, perhaps the single most evident aspect of non-competitive behaviour is that of the shipping conferences in the general freight trade. While such conferences seek to set prices and to allocate market shares, there is, nevertheless, evidence of

\footnote{Indeed, the reliance of oil companies on independent shipowners' vessels on charter as a supplement to their own capacity is a feature of this market. Thus, B.P., for example, has averaged 40.5 percent of its total fleet on charter during 1976-80 and even in the 10 years before the 1973 oil price increases and the consequent oversupply of tanker capacity, it averaged 44.7 percent of its fleet on charter.}
competitive pressures reducing their effectiveness. Thus Deakin (1973) reported their vulnerability both to tramp shipping for bulk freight with low returns and to aircraft for commodities of low weight and high value. Also, Devanney (1975) and Zerby and Conlon (1978) discovered that non-conference members could negotiate competitively priced contracts to the detriment of the shipping conference members. Indeed, Chrzanowski (1974) reported that, while there is concentration in shipping firms dealing in general freight, there is no single firm, or country which dominates this market.

Overall, therefore, competitive pressures do exist in shipping, although it must be recognised that these would be stronger in the absence of the monopolistic practices of the shipping conferences in the general cargo trade.

(b) Infrastructure: market structures

However, while this evidence on operating services (other than rail, given its existing integrated organisation) is generally supportive of Thomson's contentions regarding their competitive nature, it is difficult to be equally conclusive regarding the infrastructure and, thereby, to conclude that his distinction between their 'natural' market structures is valid and can therefore be extended to the railways.

Thus, on the basis of ownership, it is possible to observe that the state has created monopolies in the rail and road systems;
it also dominates the airports and seaports. However, to go beyond this is almost a matter of conjecture. This is partly because transport infrastructure has rarely been the subject of serious academic investigation relative to the operating services. This, in itself, is partly a reflection of the institutional arrangements (particularly for roads), which virtually makes all comment of this nature hypothetical.

Nevertheless, there is one important piece of evidence which suggests that not all infrastructure can be regarded as displaying "powerful monopoly tendencies", namely seaports. Wilder and Pender (1979), in a study of U.S. seaports, concluded that competition between them was active. They typified the form of competition as having the structure of a "differentiated oligopoly" (op.cit., p.170). This emphasis on quality and service considerations rather than pricing appears to be influenced by the subsidisation of U.S. ports and, to a lesser degree, by the influence of cartels on tariff-setting (op.cit., pp.178-179). Thus they discovered that seaports only had an advantage in the shipment of goods delivered to and from its hinterland if they were inexpensive. For cargo with a high unit value, competition between ports was keen. This finding is analogous to that of Deakin (op.cit.) in his study of the liner trades, in which shipments of a high unitary value attracted competition from air freight. Indeed, it is possible that there might also be competition between (unregulated) airports for such freight, given their basic comparability to seaports, although there is no evidence of this.
Under such circumstances, the 'infrastructure' component of Thomson's dichotomy would divide into sea - and airports on the one hand, and the transport networks of road and rail, on the other, with this latter category being the possible 'natural monopolies'.

3. CONCLUSION

It has been suggested above that, in the pursuit of a profitable railway, B.R. should be separated into a (profitable) operating company and an infrastructure company. There were two arguments in support of this. In the first instance, a case for this segregation was made on the grounds that, given the absence of a system of road pricing, railway infrastructure deficits are certain to arise. As a consequence, it is imperative that the two sections are segregated, such that inefficiencies of the operating services cannot be obscured by subsidies received for infrastructure deficits.36

Secondly, it has been shown a priori that, in general, all transport operating services are liable to be competitive, whereas the infrastructure has monopoly tendencies. Indeed, their actual market structures tend to support this view (with the possible

36 At present, infrastructure expenditure is charged direct to B.R.'s profit or loss account to be recouped as part of its subsidy, the Public Service Obligation. While this is an implicit recognition by the Government that infrastructure deficits merit subsidy, this means of payment obscures possible managerial inefficiencies in the operating services: there is no clear division of responsibility for the two different parts of the railway.
exception of seaports), although interventionist policies limit this inference. Furthermore, it was demonstrated that the principal assets of these two aspects of transport systems tend to exhibit fundamental differences: those of the operating services are likely to be divisible, relatively inexpensive, short-lived and have little or no economies of scale; those of the infrastructure (with the particular exception of seaports) are likely to be indivisible, relatively expensive, long-lived and have substantial economies of scale. The railways exhibit these characteristics, in common with other modes. Therefore, it is not unreasonable to expect that markets free from regulatory powers would develop along the lines of competitive operating services and infrastructure monopoly. As a result, there is potential for a (profitable) railway operating company.
Chapter 3

THE ROLE OF ACCOUNTING MEASURES¹ IN THE FINANCIAL
REGULATION OF NATIONALISED INDUSTRIES

This chapter is the first of four which assess the appropriateness of the profit objective to the reconstructed B.R. It makes three assumptions:

(a) that the regulation of nationalised industries can be usefully discussed, en bloc,

(b) that any possible divergences between private and social costs and benefits at B.R. are insignificant, and

(c) that non-financial indicators are of limited importance in the regulation of B.R.

Assumption (a) is relaxed in chapter 4, which looks specifically at B.R. Assumption (b) is relaxed in chapter 5, which assesses 'social profit' as an alternative to existing financial objectives. Assumption (c) is relaxed in chapter 6, which examines the potential importance of non-financial indicators.

Within this chapter, the importance of accounting measures of profit or loss in the regulation of all nationalised industries is demonstrated. The basis of such regulation rests on the

¹ This refers to the measure of profit or loss currently advocated by 'best commercial practice'. Thus, for much of this period, this was historic cost profit, but it is now current cost profit (or loss) as advocated by S.S.A.P. 16. This is discussed further below.
Government's interpretation of their statutory financial obligations, most notably by the publication of a series of White Papers, i.e. Cmnd. 1337 (1961); Cmnd. 3437 (1967) and Cmnd. 7131 (1978). The influence of each of these is considered, in turn, below. This examination is therefore in three sections:

1. Initial Attempts at Regulation (Cmnd. 1337)
2. The Developing Policy of Regulation (Cmnd. 3437)
3. The Present Policy of Regulation (Cmnd. 7131).

In section 1, it is shown, in a clarification of the familiar statutory financial obligation to 'break even', that this actually obliged nationalised industries to earn some (unspecified) level of profit. Cmnd. 1337 made the level of profit to be attained explicit in the form of financial targets, either as target returns on capital employed or as revenue account targets. Furthermore, this section shows that the basis of computing such financial results is, and always has been, comparable to that of the private sector. The stress which the first White Paper placed on conventional accounting measures also extended to pricing and investment policies. Indeed, this White Paper has even been described as an "accountant's document" (Rees, 1979, p.5).

In section 2, the influence of certain economists on the development of nationalised industry regulation is considered. This is a discussion of the intense criticism of Cmnd. 1337 by many economists. This criticism was directed at the first White Paper's emphasis on financial targets and consequent neglect of pricing and
investment policies typically advocated by economists. Thus, the appropriateness of the profit objective (even if constrained by financial targets) was placed in doubt by such critics. A particular source of criticism was the writings of welfare economists, in which they stressed the need for marginal cost pricing, regardless of its financial consequences for the industry concerned. The acceptance of this policy would have undermined the importance of financial objectives. However, it is shown that, not only was this policy never implemented effectively, but also that its reasoning is in considerable doubt. Therefore, despite such criticisms, the concept of profit or loss still played a crucial role in the regulation of these industries.

In section 3, it is shown that the 1978 White Paper attempted to overcome the practical weaknesses of the 1967 White Paper on pricing and investment policies. It also attempted to retain the concept of regulation by financial objectives, as first introduced in Cmnd. 1337. However, there are conceptual inconsistencies and practical difficulties in the scheme devised in Cmnd. 7131. The type of integration (of financial targets, pricing and investment criteria) which it seeks to achieve is illusory. Ultimately, therefore, the financial results of these industries still appear to be the most important aspect of their financial regulation.
1. INITIAL ATTEMPTS AT FORMALISING A POLICY OF REGULATION: THE ACCOUNTING APPROACH

Formal recognition of the accounting approach to financial regulation reached its peak with the publication of the White Paper, Cmnd. 1337, 'The Financial and Economic Obligations of the Nationalised Industries', in 1961. Discussion of the influence of this White Paper is concerned primarily with issues related to the financial accountability of nationalised industries - particularly their statutory financial objectives, subsequent financial targets and their relationship to accounting measures. This is necessarily so, given the concentration of Cmnd. 1337 on such matters. It had little to say on pricing and investment policies, other than broad-brush guidance that they should cover costs (unless advised by the Secretary of State to do otherwise, presumably for political reasons) and conform with procedural arrangements for the control of investment.

In effect, this White Paper tacitly allowed nationalised industries to continue with their existing pricing policies which were generally those of the 'average cost-plus' pricing type favoured in the private sector (see Munby, 1959). On investment, this White Paper also tacitly allowed the use of relatively simple rule of thumb techniques, such as the accountant's rate of return. For example, the National Coal Board continued to use accounting measures in investment appraisal until 1969 and was reluctant to abandon them. 2

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2 The N.C.B.'s views on this method of capital investment appraisal are contained in its evidence to the Select Committee on the Nationalised Industries (S.C.N.I.) in its report, Capital Investment Procedures, H.M.S.O., 1974, p.138. They stated that the major reason for their desire to continue with accounting criteria was to assess the profitability of individual pits. The N.C.B. has subsequently ceased to use such criteria in its appraisals, having made a complete transition to discounted cash flow techniques.
Also, while discounted cash flow techniques are presently used at B.R., it still assesses the impact of investment proposals on accounting profit or loss in the first year in which they would be fully commissioned.  

Thus, under these arrangements, the financial target was agreed jointly by the industry and its sponsoring department. Such targets provided a mark-up for the pricing of existing services. It also set a target rate of return for investment appraisal in the accountant's traditional approach of measuring the average net profit expected from a project in relation to capital outlay. If the industry had a financial target based on its profit and loss account (such as breaking even, or earning a specified profit in relation to turnover) this could also be linked to investment appraisal. In this case, the financial target would give the revenue account method of investment appraisal (as mentioned above in relation to B.R.) a specific measure of acceptability. Therefore, the overall scheme of financial regulation established by this White Paper might be represented as that in figure 3.1, with the financial target assuming the primary role. The dotted line signifies the absence of explicit links within Cmnd. 1337.

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3 The exact details of B.R.'s approach to investment are contained in its publication, Opportunity for Change (1976), p.69. This is a comprehensive approach based on discounted cash flows, plus assessments of the potential effect of the project on subsidies received; on its contribution to profit; and on revenue account.
Figure 3.1  Financial Regulation Under Cmnd. 1337

Financial Target

- Pricing
- Investment Appraisal

Notes: 1 return on capital employed or revenue account
2 average cost plus some margin
3 accountant's rate of return; revenue effects of investment.

These arrangements have been the subject of intense criticism, particularly from economists. The validity of such criticism, and the extent to which they influenced later developments in the financial regulation of the nationalised industries are discussed within the next section of this paper. At this point, the contribution of Cmnd. 1337 is assessed by examining the relationship of the financial targets, which were first introduced by this White Paper, to the accounting measures employed by nationalised industries. This underlines what has been said earlier as to how this White Paper produced a regulatory framework for pricing and investment which, although hardly innovative in its proposals for investment appraisal, was akin to private sector practices.
Cmnd. 1337's major contribution was its clarification of how conventional measures could be used to hold nationalised industries financially accountable. This was necessary because, on the one hand, a number of the industries had the statutory obligation to employ best commercial practice in preparing their financial statements, but on the other, the statutory definition of their financial objectives was a quite different measure of surplus or deficit from that of accounting profit or loss.

A typical example of this measure of surplus or deficit is found in the 1947 Transport Act. The British Transport Commission's measure of financial performance was to be struck after charging:

'... all charges which are proper to be made to revenue, including, in particular, proper allocations to general reserve, proper provision for depreciation or renewal of assets and proper provision for the redemption of capital' (section 93, Transport Act, 1947)

The 'charges' for the redemption of capital and for general reserve distinguish this measure from accounting profit or loss.

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4 See, for example, s.31 Coal Industry Nationalisation Act, 1946; s.46(1), The Electricity Act, 1947; s.50 Gas Act, 1948.

5 This inconsistency was not the sole reason necessitating such clarification, however. Increasing concern had been expressed throughout the 1950's regarding the financial weakness of the nationalised industries, as exemplified by the withdrawal of their right to raise debt capital on the Stock Exchange and by allegations of artificial stimulation of demand by under-pricing services, and of over-investment at the expense of the private sector. On such allegations, see, for example, Munby (1959). Interestingly enough, this latter allegation continues to be made 20 years later (Eltis, 1979). The effect of such concerns was, however, to culminate in pressure for the tightening up of the vaguely defined financial discipline of the acts of nationalisation.
However, the requirement that provision should be made for the repayment of their original (debt) capital and all increments to this capital was never enforced, even in the early years.⁶

Subsequent Acts of Parliament concerning the nationalised industries, (for example, the Transport Acts of 1962 and 1968) ceased to make reference to this provision. The second such 'charge' would conventionally be regarded as an appropriation of profit. Therefore, the statutory financial objective of 'breaking even' on revenue account, after making such provisions, implied that some (unspecified) level of accounting profit was to be earned by state corporations.

A new financial framework was introduced in Cmnd. 1337 which was consistent with the financial information which nationalised industries already produced in their annual accounts. Under these arrangements, the notion of a surplus or deficit different from that of the accounting measure of profit or loss was abandoned. The need to make provisions for the redemption of debt was discontinued. The 'allocations to reserve' were clarified as transfers to reserve (i.e. appropriations) to assist nationalised industries' financing of their capital programmes.⁷ Instead of its previous definition of surplus, the Government used the

⁶ See Para. 7, page 5, Cmnd. 1337.
⁷ Specifically, it was recommended that general reserves should be created for unforeseen contingencies, such as premature obsolescence, and that transfers to reserve should also be made equal to the difference between depreciation at replacement cost and at historic cost (para. 19, Cmnd. 1337). These recommendations were consistent with the statements of guidance issued by the Institute of Chartered Accountants in England and Wales, at that time. See, I.C.A.E.W., Accounting for Changes in Purchasing Power, Recommendation N15, 1952.
nationalised industries existing financial measures as the means of specifying the level of profit a given nationalised industry was expected to attain. However, this White Paper did introduce one novel concept - the five year 'balancing period' for financial targets - which had the potential to radically alter the form of nationalised industry financial reporting, (para 20, Cmnd. 1337).

For example, it would have been possible to publish five year profit and loss accounts as supplements or as alternatives to those prepared for the conventional twelve month period. In practice, these industries simply had targets set for a five year period. The actual targets set after the 1961 White Paper are shown in Table 3.1.

However, as a cautionary note, the Government expressed the viewpoint that the accounting measures of nationalised industries (as expressed in financial targets) could not be compared directly with those of private sector enterprises (para 13, p.5, Cmnd. 1337). Nevertheless, the Government continued to issue specific directions to state corporations which reinforced the use of accounting profit or loss (and measures derived from them) as a measure of performance assessment. For example, the most recent Ministerial direction on B.R.'s accounts specifies that they:

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8 Overall, the effect of this recommendation on nationalised industry financial reporting was negligible - typically nationalised industries did not even comment on whether they had/had not achieved their financial targets over this 'balancing period' within their annual reports. It is now a requirement of all nationalised industries that an industry's financial objective, and its performance in relation to that objective, are prominently displayed in its annual report (Cmnd. 7131, para 49, p.19).
<table>
<thead>
<tr>
<th>1. Return on Capital Employed</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) before interest and depreciation</td>
<td></td>
</tr>
<tr>
<td>(a) Electricity Boards (England and Wales)</td>
<td>12.4 percent</td>
</tr>
<tr>
<td>(b) South of Scotland Electricity Board</td>
<td>12.4 percent</td>
</tr>
<tr>
<td>(c) The Gas Boards</td>
<td>10.2 percent</td>
</tr>
<tr>
<td>(ii) before interest, but after depreciation at historic cost</td>
<td></td>
</tr>
<tr>
<td>(a) Post Office</td>
<td>8.0 percent</td>
</tr>
<tr>
<td>(b) B.O.A.C.</td>
<td>12.5 percent</td>
</tr>
<tr>
<td>(c) B.E.A.</td>
<td>6.0 percent</td>
</tr>
</tbody>
</table>

2. Revenue Account

| (a) B.R. | Reduce deficit and break even as soon as possible. |
| (b) N.C.B. | Break even after interest and depreciation (including £10 m. per year to cover the difference between depreciation at historic and replacement cost). |

Source: compiled from page 16, Cmnd. 3437.
'... shall be no less informative than if the relevant provisions of the Companies Acts applied ....' and 'shall give a true and fair view of the profit or loss of the Board and any subsidiaries ....' and '.... of the consolidated financial position'.

This directive implies comparability with 'best commercial practice' in the private sector.

The extent to which this is the case can be examined from the perspective of both (a) the substance and (b) the form of nationalised industry accounts. It is shown below that their accounts are comparable to those of private sector enterprises, on both counts. As regards the former, this has been the subject of some controversy. The single most contentious aspect is the treatment of capital assets. British Gas, for example, has attracted criticism from the financial press for charging expenditure to revenue which would formerly have been classified as capital, in an attempt to mitigate the effects of inflation (Fleet, 1977). Furthermore, recent surveys of nationalised industry accounts (Wright, 1979; Gibbs and Tailor, 1979) have also criticised their attempts at inflation accounting, particularly on the grounds that a wide variety of methods have been used since the early 1960s. Examples of this cited by Wright include the lack of compliance with Cmnd. 1337's recommendation to establish reserves by setting aside an amount equal to the difference between replacement cost and historic cost depreciation charges, which

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was limited to British Airways, the Post Office and Electricity;\footnote{Even here, Wright reports that the Electricity Council implemented this only at the instigation of the 1976 Price Code, which allowed firms to add 40 percent to these depreciation charges already in their cost base for pricing purposes. Furthermore, while the Post Office was the single nationalised industry which had most consistently applied this scheme of reserve accounting, this was an anachronism which owed little to the 1961 White Paper. The Post Office had been making such supplementary depreciation charges since the 1940s, when the statutory corporation had not been formed and the Post Office was still a Government department.} the charging of expenditure formerly classified as capital to revenue (British Rail and British Gas); the shortening of assets' lives (National Freight Corporation). Gibbs and Tailor also suggest that there has been an inverse relationship between the financial performance of the industries and their desire to adjust for inflation. Those with high profits on a historic cost basis experimented with inflation accounting; those with historic cost deficits did not. Gibbs and Tailor also implied that the relatively high proportion of capital assets within the nationalised industries, \textit{prima facie}, is a factor of overwhelming importance, making these industries particularly sensitive to inflation accounting adjustments.

However, all of this must be put into perspective. The high degree of variability of accounting treatments for capital assets within the nationalised industries is a manifestation of the lack of agreement on capital asset accounting \textit{per se}. It is symptomatic of the accounting bodies' failure to resolve the protracted debate on inflation accounting. (Even the recent Statement of Standard Accounting Practice No.16. (1980) has not ended the debate.)
However, the nationalised industries have all complied with the publication of inflation accounting information as required by the most recent official guidance, including the Hyde guidelines and Exposure Draft 24. In addition, all future accounts will fulfill the requirements of S.S.A.P. 16, making them at least as comparable as private sector enterprises. As for the reluctance of nationalised industries with financial deficits (historic cost) to comply with inflation accounting proposals, this allegation cannot be confined to state-owned corporations. Furthermore, the suggestion that the order of difficulty of problems created by this was greater in nationalised industries because of their capital intensity, must

11 It was made clear in the 1978 White Paper that compliance with any future statement of standard accounting practice on inflation accounting was mandatory for nationalised industries (Cmnd. 7131, p.26, para 72). Thus reaffirming the adoption of 'best commercial practices' by the nationalised industries. In the absence of such an accounting standard, the chairmen of all the nationalised industries responded to the 1978 White Paper by preparing interim guidelines as a 'code of practice'. It had a wider coverage than simply inflation accounting, but, on this topic, it recommended the abandonment of the type of reserve accounting advocated by Cmnd. 1337; the assessment of realistic asset lives; the publication of a current cost profit and loss account.

12 An interesting example of this is B.L. This company, which is c.99 percent owned by the National Enterprise Board with 88,000 shareholders making up the remaining minority interest, is a prime candidate for a complete return to private sector ownership if it achieves commercial success. In fact it reported a trading loss of £46 million in 1979, at which time B.L.'s Board felt unable to submit a statement in accordance with Exposure Draft No.24 on current cost accounting from the Accounting Standards Committee. The reasons given were (a) the difficulty of assessing the current cost of modern equivalent assets and (b) changes in its asset structure. Neither (a) nor (b) will be sufficient grounds for non-compliance with Statement of Standard Accounting Practice No.16, on current cost accounting. (See p.18, B.L. Annual Report and Accounts, 1979.)
be qualified. This is a generalisation which does not apply uniformly throughout the nationalised industries (c.f. National Bus and British Gas); also the magnitude of the capital employed by major private sector corporations, such as Shell, B.P. or I.C.I., matches or exceeds that of many nationalised industries, with the particular exception of electricity generation (see Table 3.2). Indeed, there are also valuation problems within these private sector corporations of a similar order of difficulty to those in the nationalised industries. (For example, the valuation of untapped petroleum and mineral reserves.) Overall then, the entire nature of this problem of comparability, as something peculiar to the nationalised industries, can be seen to have been somewhat overstated. To conclude, the substance of nationalised industry accounts is in no way non-comparable with those of enterprises in the private sector.

As for the form of nationalised industry accounts, there is little to distinguish between the annual accounts of the nationalised industries and the major publicly quoted corporations. All the nationalised industries prepare the basic financial statements of profit and loss account and balance sheet, with the accompanying sources and applications of funds statement required by Statement of Standard Accounting Practice No.10. Also, the audit report attached to those statements is on the private sector 'true and fair view' basis. But, as regards the disclosure of information within these accounts, there are differences from private sector firms which arise simply because of their public ownership. Examples of this
### Table 3.2

Capital Employed: A Comparison of Nationalised Industries and Major Private Sector Corporations (1979 costs)

<table>
<thead>
<tr>
<th>Nationalised Industries</th>
<th>£m</th>
<th>Private Corporation</th>
<th>£m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>21,480</td>
<td>Shell</td>
<td>18,709</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>11,995</td>
<td>B.P.</td>
<td>13,937</td>
</tr>
<tr>
<td>Gas</td>
<td>7,300</td>
<td>I.C.I.</td>
<td>6,552</td>
</tr>
<tr>
<td>British Steel</td>
<td>6,260</td>
<td>Unilever</td>
<td>3,614&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>B.R.</td>
<td>5,590&lt;sup&gt;1&lt;/sup&gt;</td>
<td>B.A.T.</td>
<td>3,521</td>
</tr>
<tr>
<td>N.C.B.</td>
<td>2,327</td>
<td>Esso</td>
<td>3,135</td>
</tr>
<tr>
<td>B.A.</td>
<td>1,121</td>
<td>R.T.Z.</td>
<td>2,334&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Posts</td>
<td>967</td>
<td>General Electric</td>
<td>1,584&lt;sup&gt;2,3&lt;/sup&gt;</td>
</tr>
<tr>
<td>National Bus</td>
<td>441&lt;sup&gt;2&lt;/sup&gt;</td>
<td>B.L.</td>
<td>1,145&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Source: Compiled from Gibbs and Tailor (op.cit.), plus Annual Reports and Accounts of private sector corporations.

<sup>1</sup> year ended 31st December 1978  
<sup>2</sup> at historic cost - all other figures at current cost  
<sup>3</sup> year ended 31st March 1980
include the following statements published specifically at the request of the relevant Secretary of State: schedules of grants and subsidies received; also schedules which distinguish between government and non-government borrowings and their respective interest costs. Furthermore, these industries are frequently required to disclose information over and above that found in major publicly quoted corporations, such as detailed schedules on the operating results of principal activities, (e.g. see National Coal Board accounts). In combination with the above conclusion regarding the substance of this information, it can be seen that its form and disclosure confirm its comparability with private sector enterprises.

Thus, the 1961 White Paper influenced the financial reporting of nationalised industries in a manner which has continued until the present day. It laid the foundations for a system of financial regulation (although, in the case of pricing and investment, this was virtually by default) which was compatible with the behaviour of private sector enterprises at that time, with the significant difference that the financial target was to operate as a constraint on their profitability. This financial target could be seen as the U.K. equivalent of the fair rate of return legislation for utilities in the U.S. However many commentators on U.K. nationalised industries, particularly welfare economists, had seen them as being fundamentally different in nature to the U.S. model, even before they were nationalised. The influence of this school of thought is the subject of the next section.
2. THE DEVELOPING POLICY OF REGULATION: 
THE INFLUENCE OF ECONOMISTS

It was noted above that the approach to financial regulation contained in the 1961 White Paper was subject to intense criticism. In this section, the extent to which such criticisms have influenced policy making is discussed. It was also noted that the computation of accounting profit, in accordance with best commercial practice, fulfilled a key role in establishing and measuring the financial targets of these industries. However, the significance attached to these targets as the central components of the system of financial regulation of the nationalised industries was attacked on two main grounds: (i) the nature of the financial targets, per se and (ii) its reliance on financial discipline, at the expense of allocative efficiency. The criticisms made, relating to the former, have some merit but have had little effect. Nevertheless, their validity is examined below. Also, in the case of (ii) there is continued opposition. This reflects the fact that, despite the publication of Cmnd. 3437\(^\text{13}\) in 1967, the financial target was not completely removed from the system of financial regulation. Furthermore, as argued in the next section of this paper, which discusses the influence of the 1978 White Paper, the financial target has outlasted the influence successfully exerted by economists as expressed in the 1967 White Paper.

\(^{13}\) Cmnd. 3437, "Nationalised Industries: A Review of Economic and Financial Objectives", which was seen as a vindication of the thinking of economists specialising in public utility resource allocation.
Figure 3.2 sets out the common interpretation of the relationships between the criteria for pricing and investment and the financial target within Cmnd. 3437. The dotted link indicates a relationship which was not explicitly stated within that White Paper.

Figure 3.2  Financial Regulation Under Cmnd. 3437

Pricing\(^1\) \hspace{1cm} \text{Investment}\(^2\)

\[ \text{Financial Target}\(^3\) \]

Notes:  
\(^1\) at marginal cost  \(^2\) discounted cash flows  
\(^3\) return on capital employed; revenue account.

In this model, there is a reversal of the primary role attributed to financial targets in the 1961 White Paper's scheme of financial regulation; in the 1967 White Paper, pricing and investment yardsticks have the dominant role. Furthermore, the economist's criteria of marginal cost pricing and discounted cash flow techniques of investment appraisal replaced the more traditional approaches of the accountant which held sway under the influence of the 1961 White Paper. The reality, and desirability, of the relationships set out in figure 2, are explored within this section. The criticisms
of the financial targets are assessed, first of all. This is followed by an appraisal of the more important issue of whether accounting measures (expressed as financial targets) can, or did, distort the efficient allocation of resources.

(i) Financial targets

The major criticism of the nature of the financial targets for these industries has been the lack of uniformity in their computation. Basically, the financial target should reflect the nature of the industry. At present there are two types of financial target which purport to do this - profit alone; or profit/capital employed. The validity of this distinction is examined below. However, the 'uniformity' issue is complicated by the fact that the definition of profit is different for financial targets within these basic subdivisions. This issue is also taken up below.

As regards the first consideration, the advocacy of a uniform financial target for all nationalised industries ignores the fact that these industries are not homogeneous. The major attribute which they have in common is their public ownership. Beyond this, however, their differences are profound; some are declining industries (e.g. B.R.) as opposed to growth industries (e.g. Telecommunications);

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14 Critics include the S.C.N.I. (1968), and, more recently, Gibbs and Tailor (1979) and Heald (1980) have argued for uniform financial targets on the grounds of intelligibility.

15 There have been a number of variations of this, including absolute profit targets, net profit as a percentage of turnover, and break even on revenue account.
others are labour-intensive (e.g. Postal Services) as opposed to
capital-intensive (Electricity); some have a history of
"unprofitability" (e.g. N.C.B.) others of "profitability" (e.g. Gas).

In general, the financial targets reflect this broad division.
Those classified as declining/labour intensive/unprofitable have
revenue account or profit targets; those classified as growth/
capital intensive/profitable have a financial target of profit:
capital employed. There is little difficulty with this latter
category: the return on capital provides an acceptable index of
efficiency.16

As for the first category of industries, their
targets reflect a view that the capital tied up in them has a minimal
(or even zero) opportunity cost, with revenue account targets providing
an adequate, "attainable", index of efficiency. The alternative
financial target of a return on capital employed for those with
persistent deficits would effectively specify an 'optimal' depletion
rate. This is inconsistent with the continued financial support of
such industries by their principal supplier of capital funds, i.e.
Government. This leads to consideration of the single most
contentious aspect of the lack of uniformity in financial target-
setting, i.e. not the profit v. profit: capital controversy, but
the definition of profit.

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16 It is, of course, arguable that, by employing the historic cost
basis of asset valuation, the use of return on capital employed
as a financial target has been seriously undermined by inflation
and the use of, e.g. net profit as a proportion of turnover, had
greater relevance for all nationalised industries in the 1960's
and 1970's, in the absence of a uniform basis of inflation
accounting.
The basic variations are profit after depreciation and interest, before depreciation and interest, or simply before interest. The rationale for such differences is obscure. Indeed, the type of differences of detail in financial targets shown in Table 3.1 appear to have owed more to the somewhat fortuitous circumstance of which central government department was a particular nationalised industry's sponsoring department than to anything else.\textsuperscript{17} In fact, within recent years the disparities in target-setting have increased\textsuperscript{18} and there is now some degree of pressure for rationalisation of such financial targets within the nationalised industries themselves (Jewers, 1979). In particular, both depreciation and interest charges should be deducted, as costs which have to be met, in computing the profit figure for the financial target. If interest charges are ignored, it is possible that an industry could report a positive return on capital employed when it actually had a loss on profit and loss account, after interest. Also, the inclusion of interest charges in the financial target provides a more accurate indication of the extent

\textsuperscript{17} For example, in Table 3.1, those industries with a financial target of return on capital employed before interest and depreciation (i.e. Electricity and Gas) had the Department of Energy as a sponsoring department; on the other hand, those industries with a financial target of return on capital employed before interest, but after depreciation (i.e. Post Office, B.O.A.C. and B.E.A. - now amalgamated as British Airways) had the Department of Trade and Industry as their sponsoring department.

\textsuperscript{18} As evidenced in the financial targets set out in the 1978 White Paper (in Table 3.3) which are discussed within the main text at a later stage of this paper.
to which internal resources are available to the industry to finance its investment programme.\textsuperscript{19}

(ii) Allocative efficiency v. financial discipline

The major criticism made of the 1961 White Paper was its reliance on accounting measures, as expressed in financial targets, and its neglect of the pricing and investment criteria proposed by economists for public corporations. It was therefore argued that this meant financial discipline appeared more important than Pareto-optimal resource allocation in the nationalised industries.\textsuperscript{20}

These issues are explored by examining them as they relate to the

\textsuperscript{19} This has complications in that (a) non-controversial depreciation policies are assumed and (b) the 'after interest' net profit figure has important implications for the type of accounting adjustments made under any system of inflation accounting adopted by the nationalised industries. To the extent that nationalised industries will comply with Statement of Standard Accounting Practice No.16, (a) loses relevance. However, for (b), there is a specific requirement that the gearing adjustment to be made by private sector companies (in recognition of the gains to be had by holding cheap debt at a time of rising price levels) is not to be made by nationalised industries. This has led to the suggestion that the 'before interest' measure should be used to assess the financial performance of nationalised industries (Jewers, 1979). However, the principal reason for the exclusion of this adjustment in the case of nationalised industries is that, as the Government is deemed to be both the provider of debt and the owner of the enterprise, their debt capital is classified as 'equity'. Regardless of the merits of this, however, most of these industries have considerable amounts of debt finance raised overseas and consistency would dictate that, at least for that portion of debt finance, the gearing adjustment should be made. Most importantly, the nationalised industries' expectations (regarding the loss of the favourable effects on reported profits of crediting a gearing adjustment for all debt capital, which reduces their interest costs) should not detract from the fact that their interest costs have to be met and should, therefore, form part of their financial target.

\textsuperscript{20} However, it is noteworthy that economists differ amongst themselves on the usefulness of Pareto optimality, as discussed below.
investment appraisal and pricing policies of these industries, in turn.

(a) Investment

The 1961 White Paper ignored the then existing trend away from accounting measures of investment appraisal to the discounting approach, popularised in the writings of Bierman and Smidt (1960), Merrett and Sykes (1962), Alfred and Evans (1965) and the N.E.D.O. (1965). The weaknesses of the type of appraisal implicit in Cmnd. 1337 are well known and are only briefly outlined here. The use of the simple rate of return is biased against projects which have low returns in the initial years of operation, but which have substantial benefits in later years. This problem is accentuated by the imposition of financial targets for short periods of time, such as the five year 'norm' of this period.21 Thus, projects which are strategic investments, crucial to the future of an industry, might be rejected in favour of shorter term projects. Such reservations regarding the simple rate of return apply even more strongly to the 'first full year revenue effect' method. This method simply compares profit and loss account with and without the effect of a given project for a single year, i.e. the first full year in which it comes on stream. In addition, the influence of the financial target can have a distorting effect on investment decisions. The financial target represents a broad average return to be earned

21 See para 20, Cmnd. 1337, 1961.
on all assets held. If the decision-makers within the nationalised industries perceive the financial target as a cut-off rate, then individual projects earning an adequate return less than the target might be rejected, even if such projects have positive net present values. In fact, Meek (1964) noted such investment distortions in the electricity industry. In general, any project which has a positive net present value and is, therefore, acceptable, might be rejected because of a failure to allow for the time value of money.

Therefore, the recommendation of the use of discounted cash flow techniques by Cmnd. 3437 was not a controversial matter. Subsequent investigations by the S.C.N.I. (1968, 1975) have reported on the widespread use of such techniques in the nationalised industries. However, one aspect of this approach to investment appraisal which is a matter for critical comment is the manner of its implementation. The discount rate employed, the 'Test Discount Rate', was a proxy for the opportunity cost of capital. It was recommended that it should approximate the average real rate of return expected on low risk private sector projects at that time (para 10, p.5, Cmnd. 3437). However, only a limited amount of investment proposals were actually subjected to appraisal by discounting methods using the Test Discount Rate (set at 8 percent in 1967; 10 percent from 1969 onwards; para 14, p.35, Cmnd. 7131). Cmnd. 3437 did not require all possible investment proposals to satisfy this 8 percent discount rate. For example, it specifically stated investment might be desirable for 'social or wider economic reasons', or 'in a few cases to provide services at some direct financial loss' (para 13,
In fact, a N.E.D.O. (1976) investigation found that discounted cash flow was not applied as an evaluative technique in entire industries. This is because its application requires the identification of a specific stream of costs and benefits. In practice, for industries such as British Rail, Post Office Telecommunications and British Gas, there are interdependences between the streams of costs and benefits specific to the project and those which apply generally to the entire industry. As a consequence, discounted cash flow techniques were applied to cost minimisation alternatives, but not to assessing the economic value of major projects or, indeed, of the service per se. Central government departments responsible for nationalised industries also reported to H.M. Treasury that these findings by N.E.D.O. were correct (para 59, p.23, Cmnd. 7131, 1978).

(b) Pricing policies

The pricing policies of Cmnd. 1337 were perhaps the single most contentious aspect of its scheme of financial regulation. This can largely be attributed to criticisms of the accountant's 'average cost plus' pricing which it adopted rather than the marginal cost pricing frequently advocated by welfare economists. However, marginal cost pricing has itself been the subject of active debate for decades, with many ramifications. This paper is confined to discussion of the salient point of that debate as it affects the 1967 White Paper on the nationalised industries. In appraising the influence of marginal cost pricing advocates on this White Paper, it is important to
distinguish between (1) the criticisms of Cmd. 1337, (2) the prescriptions of certain economists, (3) the stated policy contained in Cmd. 3437, (4) the interpretations of that policy and (5) the actual policy, as implemented. These issues are now examined below.

(1) Criticisms of Cmd. 1337

The major criticism of Cmd. 1337 was the scant attention it paid to the notion of allocative efficiency. Thus Shepherd (1964, p.328) attacked the 1961 White Paper's proposals as "vague private market criteria and policy rules ..... essentially an empty box". In his view this form of 'private market simulation' in the regulation of nationalised industries was "neither necessary nor sufficient as a means of reaching efficient allocation .......... the 1961 White Paper's financial targets did not offer a rule or basis for efficient price-output or investment policy for public firms."

Shepherd's paper was based on a study of the 'average cost plus' pricing policies, compatible with the Cmd. 1337-type guidelines, at the National Coal Board. The aim of this study was to assess the extent to which misallocation of resources, in the form of cross-subsidisation (i.e. the financing of unprofitable services by profitable services, by setting prices at a broad average, rather than pricing for individual services at the margin) arose at the N.C.B. because of such policies. However, despite Shepherd's finding that the N.C.B.'s long run allocation decisions were not distorted by cross-subsidisation, he persisted in his criticism of average cost plus pricing (Shepherd, op.cit. p.346).
Shepherd's paper was based on an industry which had a 'revenue account' financial target, but similar criticisms were made of those which had 'rate of return' financial targets. It was intimated above that this latter form of target-setting was comparable to the 'fair-rate-of-return' requirements of U.S. public utilities. In this respect, influential criticisms of the U.S. model, which were published shortly after Cmnd. 1337 (Averch and Johnson, 1962) are particularly relevant. This study argued that industries which are regulated by a 'fair-rate-of-return' on capital employed, and set prices on a cost-plus basis in the light of that return, would not necessarily behave in an efficient (a least-cost combination of the factors of production) manner. Specifically, they set out the hypothesis that such industries would substitute capital for labour, even where capital was expensive relative to labour, simply to deflate the rate of return by increasing the capital base and thereby reporting that a 'fair' return had been earned. A further aspect of the influence of the requirement of a specified return on capital employed in utility activities, which Averch and Johnson hypothesised, was that such corporations would expand into profitable new lines of business, using the same capital base. In this way, the overall rate of return would be reduced and the utilities would appear to comply with 'fair-rate-of-return' regulations. Support for both hypotheses was found by Averch and Johnson in a study of the U.S. telecommunications

22 c.f. Shepherd's allegations of cross-subsidisation.
industry. They therefore concluded that alternative means of pricing were necessary to ensure optimal allocation of resources.23

(2) The prescriptions of welfare economists

The previous criticisms of the 1961 White Paper might suggest that the use of marginal-cost pricing for optimal resource allocation in nationalised industries is self-evident. Indeed, the use of marginal cost pricing for public works has been advocated since Dupuit's famous bridge (1844). For state industries, (Meade, 1944), specifically, made a similar claim. However, marginal cost itself is difficult to define. Basically, there are differences of view revolving around the issue of whether the price should be set precisely equal to the derivative of the minimum total cost function with respect to output (the 'doctrinaire' approach), or whether an approximation, related to accounting costs, ('pragmatic'), will suffice in ensuring optimal resource allocation. The former version is the sense in which marginal cost pricing is used by Meade; the latter version is Dupuit's interpretation. Nor can it be said that universal agreement exists over the adoption of marginal cost pricing for nationalised industries. This opposition within the ranks of economists is based on both conceptual and practical grounds. At this point, discussion is confined to the conceptual issues: the practical implications of marginal cost pricing are discussed below in section (5), which considers actual policy.

23 Further support for the Averch-Johnson hypotheses regarding the regulated firm have come from (amongst others) Kafoglis (1969), Stein and Borts (1972).
The major issue examined within this section is what has frequently been referred to as 'the marginal costing controversy'. That is, if the industry has a decreasing cost function, its marginal cost will always be below its average cost and, therefore, pricing at marginal cost results in financial deficits. This is explored from the perspective of both the doctrinaire marginal cost-pricing advocates and the more pragmatic version. It is assumed at this stage that the industries under discussion are in equilibrium. This is relaxed in sections (3), stated policy, (4), interpretations of Cmnd. 3437, and (5) actual policy, in which the implications of short and long run marginal cost pricing in situations of disequilibrium are assessed.

The possibility of financial deficits arising from the adoption of marginal cost pricing is at the heart of the conflict between 'optimal' resource allocation and financial discipline. The proponents of marginal cost pricing, in the sense described, have noted such an eventuality, but still persisted in their advocacy of marginal cost pricing under such circumstances (see, for example, Meade (1944), Oort (1958), Shepherd (1964)). The rationale for their retention of marginal cost pricing regardless of the financial circumstances of the particular industry might be simply expressed in the following fashion. If a nationalised industry has a monopoly and sets its prices to maximise its profits, consumers who have wished to make use of its services at lower prices will be denied the opportunity; similarly, if a state industry sets its price at (the
lower) average cost plus, consumers who would be willing to pay lower prices will still be denied the opportunity to use its services. Proponents of marginal cost pricing would therefore argue that output should be expanded to the point at which price equals marginal cost and (a) the producer is covering the costs of the marginal unit of output; (b) the surpluses of consumers who would have been willing to pay more than the marginal cost price will be maximised, subject to (a); and (c) as a consequence, of (a) and (b), there will be a net increase in welfare.

However, it is interesting to compare such prescriptions with those of Dupuit, possibly the earliest advocate of marginal cost pricing. In his writings on the subject, Dupuit makes reference to the need to take account of consumers' surplus. He also makes the point that a monopolist might exploit his situation to the net loss of society, i.e. the sum of producer's plus the consumers' surplus might be less than if a lower price had been charged. In the example of an industry pricing at marginal cost and having a resultant financial deficit, the above-mentioned proponents of marginal cost pricing allege that, while the producer's surplus disappears, its deficit is held to be more than offset by consumers' surpluses. However, this is at variance with Dupuit's original recommendations, in which he clearly and unequivocally states the need to cover all costs (i.e. the production cost of the marginal unit, plus overheads) in pricing, as well as paying due regard to consumers' surpluses. Thus he stated that the aim of the public enterprise should be
"... to produce the greatest possible utility and at the same time a revenue sufficient to cover the cost of upkeep and interest on capital" (Dupuit, op.cit., p.40). This implies a form of marginal cost pricing which is more sensitive to the relationship of balancing the needs of satisfying as many consumers as possible and simultaneously having regard to the long term viability of the producer.

It is argued by many that the Dupuit interpretation of marginal cost pricing is still relevant to present policies for nationalised industries. Indeed, the use of an approximate measure of marginal cost in pricing was advocated in writings contemporary to Meade's contribution. Thus, Lewis (1949) proposed an approximation based on multi-part tariffs. Also, Ruggles (1950) criticised the doctrinaire application of the marginal cost pricing rule. She argued that the arguments advanced concerning the denial of services by charging at a price other than marginal cost could apply to all goods and services; that pricing at other than marginal cost could have a positive benefit, as, in situations of limited capacity, this meant that those who had greatest need and were, therefore, willing to pay for use of the public service actually used it;24 and, finally, that pricing systems must take account of conditions which do exist in the entire economy. This latter

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24 This pricing policy might appear to be at odds with a Government which has the equitable distribution of income as its aim. This is not so, as redistribution can be achieved via the taxation and social security systems.
point was not fully developed by Ruggles, but Lipsey and Lancaster (1956), in their classic paper on the problem of the 'second best' demonstrated that the optimal allocation of resources could not be achieved by setting nationalised industry prices equal to marginal cost when such pricing policies are not adopted elsewhere within the economy.

(3) The stated policy of Cmnd. 3437

Given these differences of opinion which existed as to the applicability of marginal cost pricing to optimal resource allocation, it was inevitable, in turn, that the stated policy of Cmnd. 3437 would be the subject of controversy. Before considering these interpretations of the 1967 pricing guidelines, the formal policy statement is outlined. This corresponds to that interpretation of marginal cost common to Dupuit (1844) and Lewis (1949), in its desire to balance financial discipline and economic efficiency.

That is, the fundamental consideration was normally to "cover accounting costs in full - including the service of capital and appropriate provision for its replacement" (Cmnd. 3437, para 17, p.8). However, prices were to be related to costs at the margin, as necessary. Thus prices were to be modified where excess capacity (i.e. off peak periods) existed - in this case price could be reduced to the level where variable costs were just covered (Cmnd. 3437, paras 19 and 20, pp.8 and 9). Also, if excess demand existed, prices were to be set to reflect the additional costs of increasing output.
in the short run (Cmnd. 3437, para 21, p.9). Where practicable (i.e. from the viewpoint of estimation) and where stable conditions of supply existed, this White Paper recommended pricing at long run marginal cost, which "naturally includes provision for the replacement of fixed assets needed for the continued provision of services, together with a satisfactory rate of return on capital employed" (Cmnd. 3437, para 21, p.9). It was also recognised that technological developments can greatly reduce long run marginal cost and, therefore, financial deficits might arise if this pricing rule was interpreted too rigidly. In this case, transitional pricing arrangements were recommended in which prices were to be related to costs at the margin, but covering accounting costs (Cmnd. 3437, para 22, p.9).

In other words, while the 1967 White Paper’s recommendations were far more precise than those of 1961 and although they instructed nationalised industries to price in a manner designed to avoid misallocation of resources, the implications of such recommendations are clear - pricing policies were still to be closely geared to financial targets. Indeed, on this point, a Treasury spokesman being interviewed by the S.C.N.I. on Ministerial Control stated that:

"In my view, the financial target is a most important criterion and not at all one to be described as a residual one. If there were to be a residual one ... (it) would be the price, not the target."25

Interpretations of Cmnd. 3437

Attaching this degree of importance to financial targets has significant consequences for pricing policy, but also for the overall scheme of financial regulation. All relevant issues raised by the Treasury spokesman's pronouncement are not raised at this stage, but the adherence to accounting measures in pricing policies was the subject of criticism and this is now discussed. There are two major strands to this. In the first instance, the interpretation of marginal cost (as defined in Cmnd. 3437) raised criticisms, particularly over the relevance of the distinction made between short and long run marginal cost pricing. There is little substance to such criticisms. Also, it is shown below that Cmnd. 3437's adherence to financial targets is not sub-optimal, despite the criticisms made on their introduction in 1961.26

One particularly severe critic of Cmnd. 3437 on pricing policy was the S.C.N.I. on Ministerial Control (1968) which attacked the concept of long-run marginal cost introduced by Cmnd. 3437. It saw this as reverting to the 1961 policy of average cost pricing, but presented as if it was marginal cost pricing.27 More recently, the distinction made between short run marginal cost and long run marginal cost in the 1967 White Paper has been described as 'essentially bogus' (Rees, 1979, p.11). However, these rejections of the 1967 proposals

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26 See section (1), Criticisms of Cmnd. 1337, below.
are effectively reviving an argument of the 1930s which had been resolved by Clemens (1941). In this paper, Clemens demonstrated that, in equilibrium, short run marginal cost and long run marginal cost coincide with the lowest point on the long run average cost curve, assuming a U-shaped cost curve (or an L-shaped one). In this respect, the S.C.N.I. were correct in saying long run marginal cost and long run average cost closely correspond as, under normal operating circumstances (c.f. para 21, p.9, Cmnd 3437), they are identical. Also, under such conditions, as Rees states, short run marginal cost and long run marginal cost are equal. Furthermore, where there is a long run decreasing cost function, Cmnd. 3437 did state that price might be set at marginal cost, and that this would result in deficits in pursuit of 'wider economic or social considerations' (para 18, p.8, Cmnd. 3437). This contrasts with the S.C.N.I. critique which, perhaps unreasonably, saw this as the typical situation for all nationalised industries. Also, in reality, these industries are unlikely to be in equilibrium - in which case short and long run marginal cost will differ. In this situation, the Cmnd. 3437 recommendation was to set price equal to short run marginal cost. This is exactly what the S.C.N.I. were advocating, if in a somewhat confused manner, as they only envisaged excess capacity situations and not those where excess demand might exist.28

28 c.f. the S.C.N.I. stance with that of Hotelling (1938), one of the principal protagonists of marginal cost pricing, as quoted in Ruggles (1950, p.20). While he advocated marginal cost pricing, in general, he also recommended the charging of an economic rent in situations of excess demand.
Furthermore, using the benefit of hindsight, it is possible to state that the 1967 White Paper's desire to combine financial targets and pricing policies with the aim of efficient resource allocation bears a close correspondence to subsequent developments in the area of 'second best' pricing criteria. Thus Baumol and Bradford (1970) argued that, since first-best Pareto optimality was unattainable in the real world, a quasi-optimal pricing system was necessary as the nearest approximation to the ideal. They demonstrated that producers should not price exactly at marginal cost, but should set prices approximately equal to marginal cost, when the industry concerned is facing a profit constraint. In this way, the relative quantities of products sold are the same as if marginal cost pricing applied and welfare losses are minimised. Expressed in terms of price elasticities, the Baumol and Bradford pricing rule is that prices should vary inversely with the elasticity of the products (Baumol and Bradford, op.cit. p.271). That is, pricing at what the market will bear, while satisfying the profit constraint. This analysis compares almost identically with that of Cmd. 3437 in which prices were to be related to the margin, but to take account of both financial targets and the market.

(5) Actual pricing policies

While the recommended pricing policies might have corresponded to criteria for quasi-optimality, the actual pricing policies adopted did not necessarily comply with Cmd. 3437. The main evidence which
suggests they did not implement the policies of Cmnd. 3437 is the N.E.D.O. Report (1976), which was based on an investigation of four major nationalised industries (British Rail, Post Office, British Gas and British Steel Corporation). Its findings confirmed those of an earlier study of the nationalised transport industries which had found that, in general, marginal cost pricing was not employed (Hunter and Thomson, 1973). However, it contrasts with a study of nationalised energy industries, which discovered both the electricity and gas industries used marginal cost pricing (Reid et al. 1973). The strength of this contrasting evidence hinges on which interpretation is given to marginal cost pricing. If the 'doctrinaire' interpretation\textsuperscript{29} is considered, then it appears that marginal cost pricing has not been employed in the nationalised industries. However, marginal cost pricing in which prices are related but not equated to marginal costs (i.e. as set out in Cmnd. 3437 and recommended by Baumol and Bradford) have been used, particularly in the electricity and gas industry. Furthermore, approximations to short run marginal cost pricing have been used by rail, airlines and telecommunications in situations of short run disequilibrium, as they had in the energy industries.

In any event, the 'doctrinaire' interpretation of marginal cost pricing could not have been implemented, for a number of reasons. For certain of the nationalised industries, prices are determined by

\textsuperscript{29} See section (2) above, The prescriptions of economists, for a definition of the 'doctrinaire' interpretation of marginal cost pricing.
the market. Also in other nationalised industries, the severity of the estimation problems presented by the systems nature of their operations has confounded the development of precise measures of marginal costs. This had long been predicted, for example, by Wiseman (1957). A major problem is the definition of the marginal unit. This means that, frequently, no unique marginal cost exists. These factors would have inhibited the 'doctrinaire' alternative in marginal cost pricing, but, as noted above, they did not prevent the more pragmatic type of marginal cost pricing. However, the most important influence operating against marginal cost pricing of both types was the intervention of Government in the early 1970's, when prices were set in accordance with the Government's counter-inflation policies. For example, British Gas, in a reply to the N.E.D.O. report, stated that it had employed long run marginal cost pricing and short run marginal cost pricing, but that it had been unable to apply such policies at the time of the N.E.D.O. investigation, because of Government intervention (thus defending

30 For example, in determining the marginal cost of transport services, the basic options for passenger traffic are to assess marginal cost in relation to (a) specific vehicles/routes or (b) vehicle/passenger journeys. Alternative (a) leads to an averaging of costs; alternative (b) should lead to a more precise marginal cost, but can lead to intractable cost apportionments and the classic problem of charging a single 'marginal' passenger, the cost of an entire vehicle, where the previous one is full. Other examples abound. For the problems of estimating marginal costs in electricity, one of the forerunners in marginal cost pricing, see Reid et al., (1973), pp.204-218.

31 This was acknowledged by the Government in its 1978 White Paper (see para 53, p.22, Cmnd. 7131).
itself against the N.E.D.O. findings of non-compliance with the marginal cost pricing guidelines).\textsuperscript{32}

In conclusion, on the issue of 'allocative efficiency v. financial discipline', it can be seen that there was much theorising and debate. Despite this, the impact of Cmnd. 3437 on pricing and investment policies had, at best, been uneven.

3. THE PRESENT POLICY OF REGULATION: IN PURSUIT OF INTEGRATION

The 1978 White Paper, Cmnd. 7131, 'The Nationalised Industries' has attempted to produce a system of financial regulation which successfully integrates the best aspects of its predecessors. It retains the emphasis of the 1961 White Paper on financial targets; it also retains pricing and investment criteria which are developments from those contained in the 1967 White Paper. Overall, it contrasts with its immediate predecessor in that the links between pricing, investment appraisal and financial targets have been made still more explicit. Nevertheless, ambiguities remain. This means that, notionally, all three measures rank \textit{pari passu}; in practice, the financial target dominates. The usefulness of this scheme of financial regulation is assessed below on three levels: (i) its aims are considered in the light of an influential critique of the 1967 White Paper, which suggested that financial targets are redundant,

(ii) the detailed implications of the 1978 White Paper are assessed and, finally, (iii) it is shown that a complete integration of the three aspects of financial regulation is an impossible ideal.

(i) The 1967 critique: over-determination

A major criticism of the 1967 White Paper was that by including criteria for optimal resource allocation (i.e. pricing and investment) and financial targets, this scheme of financial regulation was over-determined. That is, if pricing and investment criteria are established, there is no need to specify a financial target, as this will follow naturally from the pricing and investment criteria (S.C.N.I., 1968; Webb, 1973 and 1979; Gravelle, 1976; and Rees, 1979). This criticism is of vital importance to present policy as the 1967 links between pricing, investment and financial targets were far less explicit than those in the 1978 White Paper. Therefore, if the 1967 system was over-determined, then ceteris paribus, the 1978 system must also be.

However, a major limitation of this criticism, as noted in the previous section, is that frequently no unique marginal cost exists. This constitutes an obstacle to the unambiguous statement of a pricing rule, when compared to the comparative ease with which a financial target can be set. Furthermore, Littlechild (1979, pp.20-21) has challenged the 'over-determination' critique on the grounds that pricing and investment decision rules could not constitute a framework for regulation in themselves because,
"the behaviour of customers, suppliers and competitors and the future development of the economy as a whole, cannot be known with certainty to calculate the precise effects of applying the rules."

However, while Littlechild's argument has merit, it is also true that such problems might bedevil other forms of estimating, including the setting of a financial target.

The crucial distinction is the relative importance of the financial target and the pricing and investment criteria. This in itself has led to misleading criticisms. For example, Webb (1973) argued that the financial target in the 1967 White Paper sometimes appears to be a goal and sometimes it features as a constraint. However, in this context, these concepts are semantic and interchangeable. What is important is that the one can (and should) influence the other, which accords with the Baumol and Bradford (op.cit.) proposals for quasi-optimal pricing in the face of an unattainable first best.

(ii) The adequacy of the existing system

The existing system of financial regulation, as introduced by Cmnd. 7131, is set out in Figure 3.3. It can be seen that this White Paper purports to introduce a single unifying concept, as indicated by the unbroken lines of this figure, the required rate of return (R.R.R.), which is based on the opportunity cost of diverting capital from the private to the public sector. Defining opportunity cost is difficult enough. In addition, the application of the
R.R.R., as set out in Cmd. 7131, is so internally inconsistent that the integration it seeks to achieve seems most unlikely. The means by which the R.R.R. is expected to influence the three aspects of financial regulation and the extent to which it successfully does so are now examined below; for investment, pricing and financial accountability, in turn.

Figure 3.3  Financial Regulation Under Cmd. 7131

\[
\text{Financial Target}^1 \\
\downarrow \\
\text{Pricing}^2 \rightarrow \text{Investment}^3
\]

1 Required Rate of Return (R.R.R.)
2 influenced by R.R.R.
3 D.C.F. at R.R.R.

(a) Investment appraisal

On investment appraisal, Cmd. 7131 has endorsed the approach first advocated by Cmd. 3437. The discount rate to be applied to nationalised industry investment has been renamed the Required Rate of Return (R.R.R.), however, it is comparable to the
Test Discount Rate. In this case, however, the Government has set the discount rate at 5 percent rather than the 10 percent level of the T.D.R.\textsuperscript{33} The most important apparent innovation of this White Paper on investment appraisal is the requirement that the R.R.R. should be achieved on new investment as a whole. Management therefore has the discretion to use higher or lower discount rates than the R.R.R. on individual projects, so long as the overall investment programme satisfies the 5 percent discount rate. As noted above, this is quite different from Cmnd. 3437's guidance which related to individual projects. No attempt was made in this earlier White Paper to set the T.D.R. as an overall requirement for programmes of investment: its use was not mandatory in the case of projects 'desirable for social or wider economic reasons'.

Cmnd. 7131's proposals close this loophole which led to the N.E.D.O. criticisms of T.D.R. However, Cmnd. 7131 also has a major potential weakness in its investment appraisal recommendations. It repeats the Cmnd. 3437 guidance in permitting an exceptional category of investment to which the R.R.R. need not be applied. However, in this case, the exceptions are not individual types of project appraisals within all nationalised industries, instead it pinpoints specific types of activities and, therefore, industries. Basically, the exceptions relate to investment in activities for which 'social obligations imply continuing losses', for example B.R.'s passenger

\textsuperscript{33}On the grounds that the return on capital in the private sector has fallen (see pp.35-37, Cmnd. 7131).
business. This means that, while Cmnd. 7131's recommendations might have overcome the 'flexibility' (and hence the major weakness of the T.D.R.) for most nationalised industries, there exist major sectors of nationalised industry which might escape the need to apply the R.R.R. Cmnd. 7131's only answer to this is the possibility that, where costs are mostly covered by revenue from users, it might be 'convenient' to count grants received as part of such activities' income streams, as justification for investment (para 7, Appendix 1, p.34, Cmnd.7131). In effect, therefore, it seems likely that T.U.K.'s failings will persist with R.R.R., only this time such failings will be confined to that group of nationalised industries (such as B.R.) which have traditionally had a poor financial performance because of 'social obligations'. The effects of the potential failure of this aspect of the nationalised industries' financial framework on the relative importance of pricing and financial accountability are examined below.

(b) Pricing policies

On the pricing policies to be adopted by the nationalised industries, Cmnd. 7131 is somewhat ambiguous. In the main text, the philosophy of 1978 is close to that of 1961. Both White Papers

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34 In practice, for B.R.'s investment appraisal, a near-identical situation to that under Cmnd. 3437 will exist. The R.R.R. might be applied to individual projects, as the T.D.R. was, but the economic justification of the railway, of which such individual projects obviously form a part, will not be assessed. Furthermore, the discount rate for assessing individual 'cost-minimising' projects will now be at 5 rather than 10 percent.
stated that pricing was primarily a matter for the industries themselves and that they should price in the light of their financial targets. However, these White Papers also pointed to the need for Government to 'take an interest' in nationalised industries' pricing policies. (Cmd. 1337, paras 29, 30 and 31; Cmd. 7131, para 68). On marginal cost pricing, Cmd. 7131 confines itself to statements regarding the Government's need to satisfy itself that nationalised industries' price structures are properly related to the costs of supply and the market situation. A further reference is made to this need for prices to reflect short run situations of excess capacity.

Specifically on long run marginal cost pricing, Cmd. 7131 accepts N.E.D.O.'s criticisms of the Cmd. 3437 approach in its main text: it was not seen as being applicable to all nationalised industries (para 66, p.25, Cmd. 7131). However, in Appendix 1 to this White Paper, it appears to advocate a form of long run marginal cost pricing. The capital element in the marginal costs of increasing a given industry's output would be represented by the discount rate which equates the future net cash flows of its entire capital programme with its capital cost (para 4, p.33, Appendix 1, Cmd. 7131). This could obviously differ from the 5 percent R.R.R. Yet the White Paper recommends, in the next paragraph, that for those industries which already measure long run marginal costs, the 5 percent R.R.R. should be used to calculate the capital element. In any event, to use the first means of obtaining the capital element
of a long run marginal cost computation for pricing policies is not possible, if L.R.M.C. pricing is to be consistently applied. This is because one needs an estimate of L.R.M.C. to price future outputs in the D.C.F. computation, before the calculation can be made. The approach advocated is internally inconsistent: the capital element of marginal cost is required to set up the computation, but it cannot be provided until the computation is solved.\footnote{A 'more approximate' method of deriving an estimate of L.R.M.C. which incorporates the R.R.R. is suggested in this Appendix. Basically it suggests industries estimate the prices necessary to cover all the costs of producing the output associated with the capital programme, including capital costs. This still presents considerable estimation problems for industries, such as B.R., which are multi-product concerns, with considerable joint costs.} It seems unlikely that these recommendations will have much effect other than in those industries which have already complied with Cmd. 3437 proposals in establishing L.R.M.C.s of their operations. For those industries, such as B.R., which price according to market conditions, it appears that the Cmd. 7131 guidelines will make little change to existing practices in pricing.

\subsection*{(c) Financial accountability}

The system of financial accountability contained in the 1978 White Paper is virtually identical to that of the 1961 and 1967 White Papers. The financial targets of these industries at the time of the 1978 White Paper are shown in Table \ref{tab:3.3}. It can be seen the familiar dichotomy persists between those industries which have a financial target expressed on revenue account and those which have a target return on capital employed.
Table 3.3  Financial Targets of the Nationalised Industries in 1978

1. Return on Capital Employed

(i) before interest, but after depreciation at historic cost
   (a) British Airways 11 percent
   (b) British Transport Docks Board 20 percent

(ii) before interest, but after depreciation at replacement cost
    Telecommunications 6 percent

(iii) after interest
    Giro (capital is defined as P.D.C. plus retained profits for Giro) 12.5 percent

2. Revenue Account

   (a) Posts 2 percent return on turnover
   (b) B.R. break even (after grants)
   (c) British Waterways break even (after grants)
   (d) National Bus break even (after grants)
   (e) Scottish Bus Group break even (after grants)

Source: Cmnd. 7131, p.38.
There are, however, two apparently significant differences in the Cmnd. 7131 style of setting financial targets compared to the earlier White Papers. In the first instance, as a starting point in establishing the financial target for a given nationalised industry, the R.R.R. is to be taken into account. This is an attempt to strengthen the proposed integrated financial framework based on the opportunity cost of capital for the public sector. However, this presupposes the facility to measure R.R.R. exists.

If the state industry in question provides services from old and new assets which are indistinguishable, the expected revenue figure for future output would be obtained directly from the prices needed to earn the R.R.R. on new investment. A deduction would then be made from this expected revenue figure for depreciation (computed in accordance with best commercial practice) and the net result would be expressed as a target return on capital employed. This procedure might be applied without difficulty to the utilities - gas, electricity, perhaps telephones. However, for those industries, such as B.R., which have difficulty in estimating long run marginal cost and might also have to price according to what the market will bear, this procedure could not operate. In other words, this 'significant' difference in setting financial targets will operate on a piecemeal basis, if at all.

Furthermore, as noted earlier, a number of factors might come into play in determining the actual financial target, for example, the implications of pricing policy for Government's counter-inflation
policies and public sector borrowing requirements. This leads us to the second apparent difference introduced by the 1978 White Paper: it was the Government's intention to publish the various factors involved in setting a financial target for each state industry. Under this arrangement, the Secretary of State responsible for each industry was required to announce the agreed financial target to Parliament and state the main assumptions on which it is based (para 73, p.26). It was hoped to improve public accountability in this way. However, greater information will be necessary than that disclosed in the 1978 White Paper with regard to B.R.'s financial target. This simply states that the railways must 'break even .... after the receipt of grants, predetermined on a reducing scale, towards the cost of the railway passenger business, and, up to the end of 1977, central government grants covering the deficit on the rail freight and parcels business'. This is little more than the type of information made public on its financial target at the time of the 1968 Transport Act, for example.

(iii) The elusive nature of integration

As the previous analysis shows, the type of integration for which the 1978 White Paper strives is illusory. At the crux of the matter is the need to combine two, quite distinct, measures. On the one hand, a measure of assets employed is required both for setting financial targets and assessing financial accountability - a role

36 A list of such factors is contained in para 73, p.26, Cmnd. 7131.
which accounting measures fulfill; on the other hand, it is generally accepted that discounting methods are the most appropriate method of investment appraisal. The failure of the 1967 and 1978 papers to reconcile these fundamentally different measures was inevitable. In this respect, a trade-off has to be made between the needs for financial accountability and for allocative efficiency. For example, the 1961 White Paper presented an integrated framework based on accounting measures. However, its defects, particularly of crude investment appraisal techniques, are widely acknowledged.

At the other extreme, if integration is the aim, it would be possible to prepare financial statements based entirely on discounted cash flows (i.e. 'economic income'). This concept of income is what lies behind the proposals of a number of economists (e.g. Webb, 1979) to charge the R.R.R. against the profit and loss account, instead of the nominal costs of servicing capital. In this respect, such a proposal represents a stumble towards economic income. If this concept of income was adopted, the discounting approach presently applied to incremental investment would be extended to the income streams of total assets held, with the R.R.R. as the cost of capital. This also facilitates the application of the Turvey (1971) approach to marginal cost pricing, as set out in Appendix 1 to the 1978 White Paper, and discussed above. All of this represents a gain from the perspective of integration of the means most likely to achieve allocative efficiency. However, this gain is at the loss of an adequate measure of financial accountability. Only Kay (1976) has
suggested that the accountant's rate of return might approximate to the D.C.F. return. He makes the simplifying assumption that capital values at the beginning and end of periods, as computed by accountants, would be acceptable to economists as approximations to the net present value of these assets. This has, rightly, been contested as an invalid assumption (Wright, 1976). Indeed, the economic income concept's usefulness as a device for monitoring a firm's periodic financial performance is severely limited by the need to make long term projections of cash flows. This has always been rejected by accountants as too subjective compared to the traditional accounting measures which are computed 'after the event', (Baxter, 1970, p.20; Harcourt, 1965). It is these reservations which would make its adoption by the nationalised industries conflict with their directives to prepare accounts in accordance with 'best commercial practice'. Therefore, it is evident that the notion of integration is an elusive one and some compromise between accounting measures and criteria for pricing and investment is inevitable.

4. CONCLUSION

The most enduring feature of the three attempts by the White Paper to establish a financial framework for the nationalised industries has been the role of accounting measures as yardsticks of their accountability. This has been reinforced by the fact that this is the only aspect of their financial framework which is a statutory obligation. By statute, these industries are obliged to
at least break even on revenue account. There is no comparable statutory obligation regarding pricing or investment policies. At those times when the White Paper recommendations have fallen into disuse for one reason or another, this fundamental financial obligation has provided their financial framework.

The recommendations of Cmnd. 3437 on long run marginal cost (L.R.M.C.) pricing proved abortive. Perhaps this is not surprising given the sensitivity of the pricing issue for such fundamental parts of the U.K. economy. In any event, current policy leans partly towards the notions of Cmnd. 3437 on L.R.M.C. pricing, but realistically points to the need to accept a more pragmatic style of pricing for certain of these industries. On investment appraisal, the lack of guidance in 1961 is perhaps a reflection of the state of the art of such techniques at that time. However, Cmnds. 3437 and 7131 have both recommended the use of discounting methods with some success.

Overall, the 1967 White Paper was the first attempt to provide an explicit integrated financial framework for these industries, covering pricing, investment and financial targets. Its failure has not prevented Cmnd. 7131 striving to produce an even tighter integration of the pricing, investment and financial target cornerstones of the nationalised industry financial framework. The current financial framework rests on the applicability of the R.R.R. to pricing, investment and the setting of financial objectives. As set out in the 1978 White Paper, there are technical drawbacks and conceptual
inconsistencies in its potential application, particularly in the aim to reflect the opportunity cost of capital in all three measures. These potential difficulties point to the perpetuation of accounting measures as the major feature of the financial regulation of these industries.
Chapter 4

THE INFLUENCE OF ACCOUNTING MEASURES ON U.K. RAILWAY POLICY

In the previous chapter, it was shown that (a) the regulation of B.R. (in common with other nationalised industries) has been dominated by the attainment (or otherwise) of its financial objective, (b) that the basis of computing such results is (and always has been) comparable to private sector practices and (c) that the incurrence of financial deficits by marginal cost pricing as a deliberate policy of 'social welfare' maximisation is a dubious one. On these grounds, it might be argued that the profit objective (constrained by a prescribed financial target, as a state industry, or unconstrained in this fashion, as a private corporation) is appropriate for the reconstructed railways envisaged in chapter 2. On the other hand, it might equally be argued that the railways are of such fundamental importance to society that wider considerations than purely commercial criteria should form their objective. Indeed, the Government appears to have weakened the importance of financial measures by regarding B.R. as a 'social' rather than a commercial corporation, particularly with its legislation of 1968 and 1974. However, it is shown within this chapter that the differences in the Government's treatment of a railway corporation which it regards as 'commercial' or 'social' are more apparent than real. Despite such
apparent changes, the Government has used financial measures as 'triggers' or key indicators influencing B.R.'s development.¹

1. THE USE OF FINANCIAL MEASURES IN PRACTICE

At the outset it is important to note that a major reason for the importance of financial measures in initiating strategic policy decisions on the railways has been the different treatments accorded to B.R.'s financial and non-financial statutory obligations. In common with other state corporations, British Rail has received guidance from Government on the interpretation of its statutory financial obligations. As noted in chapter 3, this is most evident from the White Papers of 1961, 1967 and 1978. However B.R.'s wider statutory obligation,

'...... to provide railway services .... and to have due regard .... to efficiency, economy and safety of operation ......'²

is virtually a verbatim and non-explicit repeat of that contained in the 1947 Act. Beyond this, B.R. has lacked a precise statement from Government on its non-financial objectives (and, indeed, on Government

¹ The emphasis within this chapter is therefore on the actual response of Government to B.R.'s financial results. However, the continuing importance of financial measures in this fashion is dependent upon the development (or otherwise) of alternative means of assessing the performance of the railways. Such alternatives are discussed within chapters 5 and 6 below.

² Section 3(1), Transport Act, 1962.
transport policy as a whole) which can readily be translated into measurable variables to facilitate the assessment of its non-financial performance. This is not to say that the Government is unaware of the wider issues involved in transport policy. It has acknowledged that the transport sector of the economy has multiple objectives, but it has also hinted at the difficulty, if not the impossibility, of their measurement. Under these circumstances, as is shown below, it is inevitable that B.R.'s financial record will be a key criterion in pointing up the need for changes in Government policy, even if it is not the prime indicator in the actual policy decisions.

To date, there have been three major events in the corporate history of British Rail in which its financial performance has fulfilled this role of key indicator or 'trigger' for policy changes regarding the size of the railway system and its role in the U.K. transport network. These are the Transport Acts of 1962 and 1968 and the Railways Act of 1974. The Transport Act of 1962 saw the inception of British Rail as a corporation in its own right: previously it had been part of the British Transport Commission holding company. The 1968 Act explicitly introduced the concept of

3 See, for example, para 9, Transport Policy, Cmnd. 6836, 1977, which states transport objectives are the provision of an 'efficient service', which meets 'social needs' and minimises harmful 'environmental effects'. Also para 72, in which it states that the allocation of resources between the different parts of public sector transport must be based on a balance between 'economic, social and environmental aims'. However, within the context of road traffic, the Government stated that 'social costs' of this form of transport cannot be measured in an objective way (para 183). Such measurement problems are examined in chapter 5.
a 'social role' for sections of B.R.'s passenger services. Finally, the 1974 Act effectively designated B.R.'s entire passenger services as a 'social service'. It is shown below that adverse financial results initiated these three significant changes in the regulation of the railways.

2. THE TRANSPORT ACT, 1962

The 1962 Transport Act saw the demise of the British Transport Commission, which had held responsibility for all inland surface transport services in public ownership. The major factor which led to this reorganisation was the weak financial performance of the railways. This can be seen from the Government's treatment of the railway's Modernisation Plan of the 1950's. This plan was conceived of as a strategic framework to allow the reorganisation and re-equipping of the railways which had been unable to modernise since the pre-war years. The Modernisation Plan was accepted by the Government on

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4 The adjective 'social' has been criticised on the grounds of ambiguity. As Hayek (1976) puts it, this adjective can be used 'to describe almost any action as publicly desirable and at the same time have the effect of depriving any terms with which it is combined of clear meaning' (The Mirage of Social Justice, Routledge, Kegan & Paul, p.79). However, this was the statutory description applied to financially unremunerative passenger services retained at the request of the Minister of State. It is therefore used in this chapter, without further discussion, but possible ambiguities are explored in chapter 5.

5 On the rundown of the railway's capital assets at the end of the war and in the immediate post war years, see, for example, H. Polllins, Britain's Railways, 1971, p.166.
the basis that the British Transport Commission proposals showed
the railways would earn an 'adequate' surplus by 1960/61. In
1958, the Minister requested a re-appraisal of this plan by B.T.C.,
because of the extent to which the railway's financial results had
deteriorated in the years after its acceptance. This was despite
the Plan's initial acceptance on the understanding that financial
deficits would occur in the years up to 1960, after which a surplus
was expected to be earned.

It was the Government review of the financial failure of
this plan which pinpointed the railway sector as the major problem
area within the British Transport Commission. This was summed up
by the Government as follows:

".... the heart of the problem is the railways .... (they)
are now in a grave financial plight. They are a long way
short (by about £60 million a year) of covering even their
running costs ........"8

As Table 4.1 shows, the railways were unable to make any contribution
to central overheads from 1956 onwards, whereas B.T.C.'s other
activities generated an annual operating surplus every year. This
picture of events prompted the Government to establish the railways
as an independent entity, with a reduced rail network, on the view

6 para 24, page 6, The British Transport Commission: Proposals for
the Railways, Cmnd. 9880, 1956.

7 para 14, page 6, The British Transport Commission: Re-appraisal of
the Plan for the Modernisation and Re-equipment of British Railways,
Cmnd. 813, 1959 and para 26, page 12, Observations of the Minister of

8 paras 5 and 6, Reorganisation of the Nationalised Transport
Table 4.1 The Railways' Financial Performance, 1948 to 1962

<table>
<thead>
<tr>
<th>Year</th>
<th>Operational Surplus or (Deficit) Railways</th>
<th>Net Profit or (Loss); Other Activities</th>
<th>British Transport Commission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£mill</td>
<td>£mill</td>
<td>£mill</td>
</tr>
<tr>
<td>1948</td>
<td>26.3</td>
<td>12.4</td>
<td>(8.1)</td>
</tr>
<tr>
<td>1949</td>
<td>12.7</td>
<td>10.9</td>
<td>(23.6)</td>
</tr>
<tr>
<td>1950</td>
<td>26.3</td>
<td>6.5</td>
<td>(11.0)</td>
</tr>
<tr>
<td>1951</td>
<td>35.0</td>
<td>8.8</td>
<td>(0.1)</td>
</tr>
<tr>
<td>1952</td>
<td>39.6</td>
<td>11.1</td>
<td>3.6</td>
</tr>
<tr>
<td>1953</td>
<td>35.1</td>
<td>18.2</td>
<td>(2.0)</td>
</tr>
<tr>
<td>1954</td>
<td>16.6</td>
<td>21.0</td>
<td>(21.9)</td>
</tr>
<tr>
<td>1955</td>
<td>2.1</td>
<td>18.9</td>
<td>(38.3)</td>
</tr>
<tr>
<td>1956</td>
<td>(16.5)</td>
<td>18.6</td>
<td>(57.7)</td>
</tr>
<tr>
<td>1957</td>
<td>(27.1)</td>
<td>20.7</td>
<td>(69.0)</td>
</tr>
<tr>
<td>1958</td>
<td>(48.1)</td>
<td>17.3</td>
<td>(90.7)</td>
</tr>
<tr>
<td>1959</td>
<td>(42.0)</td>
<td>26.6</td>
<td>(84.8)</td>
</tr>
<tr>
<td>1960</td>
<td>(67.7)</td>
<td>28.4</td>
<td>(112.9)</td>
</tr>
<tr>
<td>1961</td>
<td>(86.9)</td>
<td>30.3</td>
<td>(134.9)</td>
</tr>
<tr>
<td>1962</td>
<td>(104.0)</td>
<td>31.2</td>
<td>(156.1)</td>
</tr>
</tbody>
</table>

1 refers to rail passengers and freight operations.
2 this includes income from inland waterways, docks, certain shipping services, road haulage, London Transport (road and rail), commercial advertising, hotels and catering, the letting of properties.

that this would prove profitable. At the time of the 1962 Act, the railways had a total route mileage of circa 17,500 miles. Within 5 years, this had been reduced to a total mileage of circa 13,200 miles. These 'Beeching cuts' of the early 1960's were the direct result of this policy of seeking a commercially viable railway system - a policy response to the 'trigger' of accounting losses, on the assumption that the railway could be profitable.

3. THE 1968 TRANSPORT ACT

Within six years of the Government's acknowledgement that the financial failure of the railways was the central problem of public transport services and its proposed solution of reducing the rail network, a major policy change was effected in a new Transport Act (1968). In this statute, the Government sought to establish a new financial framework for the railways. To assist in devising this framework, it had established a Joint Steering Group of central government officials, B.R. officers and outside 'experts'. Its terms of reference to this Joint Steering Group (J.S.G.) noted that the persistent deficits of British Rail since the Act of 1962 showed that its financial objective (to 'pay its way' by 1968) was 'entirely unrealistic. In its White Paper in reply to the J.S.G. report the Government stated that:

9 paras 7 and 12, Cmnd. 1248, op.cit.
"... there can be no doubt that the continuing deficit of well over £100 million a year has been a major cause of the growing feeling, both within the railways and outside, that the industry was ailing and in decline." 11 (see Table 4.2).

These references before and after the J.S.G. reported suggest the Government attached importance to B.R.'s financial performance as a signal for a new railway policy.

The 1968 solution to the financial deficits of the railways was to distinguish between commercially viable and financially unremunerative sections of B.R. Most of the passenger services and the freight services were considered to be 'commercial'. Passenger services which were financially unremunerative could be retained at the discretion of the Minister for 'social or economic reasons' (s.39 (1)(b), 1968 Act). The issue of just what meaning can be ascribed to these powers is taken up below.

In the first instance, this policy regarding passenger services implies a change in emphasis from Government reliance on the purely commercial criteria of accounting profit or loss employed in the 1950's and early 1960's. Indeed, the Government stated in a White Paper, prior to the report of the Joint Steering Group that:

"... the touchstone of a sound railway policy is the extent to which it meets the country's overall transport needs. Commercial viability is important but secondary ...." 12

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11 para 14, p.4, Cmnd. 3439.
<table>
<thead>
<tr>
<th>Year</th>
<th>Working Surplus or (Deficit) £mill</th>
<th>Net Profit or (Loss) £mill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>(81.5)</td>
<td>(133.9)</td>
</tr>
<tr>
<td>1964</td>
<td>(67.5)</td>
<td>(120.9)</td>
</tr>
<tr>
<td>1965</td>
<td>(73.1)</td>
<td>(132.4)</td>
</tr>
<tr>
<td>1966</td>
<td>(71.6)</td>
<td>(134.7)</td>
</tr>
<tr>
<td>1967</td>
<td>(90.5)</td>
<td>(153.0)</td>
</tr>
<tr>
<td>1968</td>
<td>(87.9)</td>
<td>(147.4)</td>
</tr>
</tbody>
</table>

Notes:  

1 this includes net income from catering, commercial advertising and the letting of operational property.

Source: British Rail, Annual Report and Accounts, 1963-68.

This reaffirms the above contention that financial measures would become less significant and something called 'overall transport needs' would assume their place. However, the 1968 Act not only retained B.R.'s statutory financial obligation to break even over its entire operations, but the 'trigger' or indicator for the Minister to assess the 'social or economic reasons' for a line's possible retention was its financial record! In other words, the non-commercial aspect of B.R. operations would become of secondary importance. Furthermore, the nature of the 'social' or 'economic' reasons for possible retention were never made explicit. Indeed, it is unclear to what
extent these criteria to be applied to financially unremunerative services under the 1968 Act were actually employed in an objective fashion. To give an indication of the approach adopted, the Ministry of Transport published one such report on a possible closure (The Cambrian Coast Line, 1969).\(^{13}\) This study suggests the ultimate decision to close or to provide financial support was unrelated to the 'social' or 'economic' facts of such studies. The adverse result of the Cambrian Coast Line cost benefit analysis was the basis on which the Minister of State recommended its closure in 1970. However, this line was subsequently reprieved, with an increased subsidy.

It is also important to note that the avowed policy of down-grading B.R.'s commercial viability as a yardstick of its accountability (as expressed in the Government White Paper prior to 1968 and in the 1968 Act itself) is incompatible with the circumstances influencing the need for that Act. It was the series of financial deficits earned by B.R. after the 1962 Act (see Table 4.2), which appears to have precipitated the review of its activities which not only led to the 1968 Act, but a further reduction of the size of the rail network to \(\text{circa}\) 11,000 route miles.\(^{14}\)

\(^{13}\) This was a standard cost benefit analysis in which valuations were made of the time savings generated by rail travel; additional road and bus costs avoidable by the retention of the line and an adjustment for railway staff with no alternative local employment prospects. It concluded that there was a cost (1969) of £7.5m if retained indefinitely (a lower estimate) and £6.95m if retained for 10 years, pp.31 and 32, The Cambrian Coast Line, 1969.

\(^{14}\) para 3, Cmnd. 3439, op.cit.
4. THE 1974 RAILWAYS ACT

In practice, the terms of the 1968 Act soon failed to provide B.R. with a financial structure which enabled it to declare a profit and comply with its financial objectives. Within three years of its enactment, B.R. had made a loss as measured by its profit and loss account; within a further two years, B.R. recorded a loss on its operating account (see Table 4.3).

Table 4.3 The Railways' Financial Performance, 1969 to 1975

<table>
<thead>
<tr>
<th>Year</th>
<th>Working Surplus or (Deficit)</th>
<th>Net Profit or (Loss)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£mill</td>
<td>£mill</td>
</tr>
<tr>
<td>1969</td>
<td>48.6</td>
<td>14.7</td>
</tr>
<tr>
<td>1970</td>
<td>47.4</td>
<td>9.5</td>
</tr>
<tr>
<td>1971</td>
<td>26.2</td>
<td>(15.4)</td>
</tr>
<tr>
<td>1972</td>
<td>17.8</td>
<td>(26.2)</td>
</tr>
<tr>
<td>1973</td>
<td>(4.1)</td>
<td>(51.6)</td>
</tr>
<tr>
<td>1974</td>
<td>(96.9)</td>
<td>(157.8)</td>
</tr>
<tr>
<td>1975</td>
<td>(42.3)²</td>
<td>(60.8)²</td>
</tr>
</tbody>
</table>

Notes: ¹ These figures include net income from catering, commercial advertising and the letting of property. They also include subsidies received under section 39 of the 1968 Transport Act for 1969 to 1973.
² The definition of revenue expenditure changed under s4(1) of 1974 Railway Act, as did the calculation of subsidy payments (s3(2), same Act).

As early as 1970 and 1971, British Rail's financial results and forward plans had, in the words of its financial controller,

".... provided strong indications (to the Railways Board) that there was no real prospect of the railways being able to meet their statutory obligations."\(^1\)

The first of these financial plans projected that, by 1975, British Rail's cash inflow would not be sufficient to cover its interest payments and that it would have to borrow £87 million from the Exchequer for this purpose. This prospect of financial deficits for B.R. initiated further studies to determine whether there was some level of rail network which was financially viable.\(^2\) These studies were carried out in three phases: an initial study, by B.R. economists, and first and second stage studies by B.R.'s finance department. All of these reports were made available to the Department of Environment (D.O.E.).

The merits of these various schemes do not concern us here, but the criterion by which the D.O.E. sought to assess them is clearly of relevance. The first stage study, for example, assessed the relative merits of four different sizes of rail networks in financial terms. The D.O.E. officials recommended the fourth option to the Minister responsible for B.R. on the basis that it showed 'a somewhat more favourable financial return'.\(^3\) Similarly, the D.O.E.

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\(^2\) These studies were not published but are reported on in The Rail Problem, Pryke and Dodgson, 1975.

\(^3\) quoted in Pryke and Dodgson, op.cit., p.17.
rejected the second stage study of a further four possible rail networks on the grounds that there was unlikely to be "any significant difference in their financial out-turn compared with the present Plan". As a consequence of B.R.'s adverse financial results and these B.R. policy studies, the Minister of State initiated a review, with the purpose of providing a new financial framework for the railways. These actions of the British Rail Board, the D.O.E. and the Minister of State demonstrate their responsiveness to the fundamental financial objective of breaking even, contrary to the Government stance, as stated in its 1966 White Paper, that 'commercial viability' was a 'secondary consideration to overall transport needs'.

Nevertheless, the rationale presented for the 1974 Railways Act (which was prompted by the above mentioned review) reinforced the 1966 sentiment and, indeed, even went further by setting aside commercial viability for passenger services as a consideration at all. Thus, when the Minister of Transport introduced the Bill for the 1974 Act in the House of Commons, he described this Act as giving statutory recognition to the alleged fact that

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18 quoted in Pryke and Dodgson, op. cit., p.19.

19 A subsequent Minister of Transport, Mr. Mulley, attributed this Ministerial initiative to the fact that the "underlying trend of deteriorating finance" was "not apparent for a year or two after the 1968 Act, when .... the railways made a small book profit ....", p.1005, Parliamentary Debates (Hansard) 5th Series, Vo.875, House of Commons, Session 1974.
"... the railways are not a normal nationalised industry but a unique type of public corporation which exists to serve social and environmental purposes as well as economic needs ....."\textsuperscript{20}

In the same debate, another Government spokesman underlined the Transport Minister's position, by stating that,

"The Government are providing a grant for the whole passenger system, because they recognise that the railways are basically uncommercial but perform a valuable social service."\textsuperscript{21}

However, in practice, the provisions of the 1974 Act ensure that financial measures will continue to take up the role of key indicators of the need for change in Government policy, regardless of 'social and environmental' considerations. In the first instance, this Act reaffirms the conventional 'break even' objective. Freight traffic was to break even without subsidy; passenger traffic was to break even after the receipt of a subsidy for the total passenger service, which is related to the level of service provision in 1974. The financing arrangements for B.R. passenger operations, with its overall subsidy, have resulted in the abandonment of the cost benefit appraisals of individual passenger lines. This means that only financial measures will be available to the Government in key policy decisions. Furthermore, there is an upper limit\textsuperscript{22} on the Public

\textsuperscript{20} Mr. Mulley, in Hansard op.cit., p.1005.
\textsuperscript{21} Mr. Carmichael, Under-Secretary of State, D.O.E., in Hansard op.cit. p.1111.
\textsuperscript{22} At present this subsidy is limited to £900 million, with provision for its increase to £1500 million (Railways Act, 1974, section 3(4)).
Service Obligation subsidy, which, if and when it is breached by an accounting loss, will initiate a new Government railway policy.

5. CONCLUSION

In conclusion, it can be seen that financial measures have been of importance in Government policy decisions regarding the railways. The Government has acknowledged the existence of wider aspects than the purely financial in resolving the 'rail problem'. It has changed from a primarily commercial view of what B.R.'s aims are, to the late 1960's notion of a commercial and non-commercial passenger railway. In the 1970's, the notion of B.R. as a unique corporation because of the 'social, environmental' and 'economic' impact of its operations has found favour with Government. In practice, however, these different concepts of 'what B.R. is' have been more apparent than real. Financial measures have provided the key to all the significant changes in the rail system. Therefore, the impact of B.R.'s reported profits (losses) has influenced major policy decisions, despite Government protestations that 'commercial considerations' are only of secondary importance.  

Indeed, a further example of Government's reliance on financial measures, albeit of lesser significance than the changes brought about by the above mentioned Acts of 1962, 1968 and 1974, is its response to proposals for a major electrification scheme. This scheme was supported by a joint study by B.R. and the Department of Transport (British Rail: Main Line Electrification, Department of Transport, H.M.S.O., 1979). However, in response to this study, the then Secretary of State for Transport, Mr. Norman Fowler, stated that:
However, the extent to which policy-makers might have responded to some criterion other than B.R.'s reported profits (or losses) is dependent upon the feasibility and desirability of producing a satisfactory alternative. Such possibilities are explored within Chapters 5 and 6 below.

23 (contd)

".... I (Fowler) am inviting British Rail to prepare and submit a 10-year programme of schemes for electrification only of those potentially profitable main line routes where it is clear that the benefits could justify the investment..." (Parliamentary Debates (Hansard), Issue No.1212, 22 June, 1981, p.22.)

This statement was made in the context of poor interim financial results for the railways, which were attributed to B.R.'s inability to increase revenues and reduce costs (Hansard, op.cit. p.21). The consequent stress placed on commercial criteria of success is a further clear indication of Government's responsiveness to signals from B.R.'s record of profit or loss.
Chapter 5

ALTERNATIVES TO ACCOUNTING MEASURES: (1) SOCIAL PROFIT OR LOSS

In previous chapters it has been shown that accounting measures of profit or loss are the dominant consideration in the regulation of nationalised industries (chapter 3) and that such measures have been of crucial importance in influencing U.K. railway policy (chapter 4). All of this points to the relevance of the profit objective to the reconstructed railway operating services (as envisaged in chapter 2), whether they are state-owned or not. However, as noted in chapter 4, recent legislation and the pronouncements of certain Ministers of Transport suggest that this represents too narrow an objective for the railways and that 'social' considerations should be taken into account. Indeed, there is also support for such an approach in the literature on nationalised industries. This suggests that the continuing importance of financial objectives (and their attainment) will be undermined if it is possible to construct an index of 'social profit or loss'. However, this is a matter of considerable controversy. The potential for the measurement of 'social profit or loss' is assessed in three stages:

1. An outline of the debate surrounding the 'social profit' controversy,

2. The measurement of 'social profit or loss' as a theoretical ideal,

3. The derivation of an approximation to 'social profit or loss'.
In this assessment, the yardstick is the provision of an indicator which is operational. That is, an index which is capable of measurement and consistent with the objectivity and verifiability requirements of current financial information, as essential criteria to ensure the credibility of B.R.'s reported results. It is shown below that the concept of 'social profit or loss' espoused by the critics of existing measures of profit or loss is indeed illusory. However, by relaxing this theoretical ideal, it is shown that, on the one hand, the notion of a 'social profit or loss' is largely an irrelevance to the railway operating company in the proposed reconstruction in chapter 2, but on the other hand, there is a distinct, major social benefit associated with the proposed railway infrastructure company. This finding lends further support to the appropriateness of the profit objective to the reconstructed railway operating company.

1. PRIVATE v. SOCIAL COST AND BENEFITS

At present, as noted above, the conventional measure of profit or loss has an important role to play in the financial regulation of this industry, just as it has for other state-owned corporations. This has led to criticisms of B.R. (and other nationalised industries) on the grounds that their financial performance has been poor (Polanyis, 1974). On the other hand, there is a school of thought which argues that such criticisms are misleading, because the existing measure of profit or loss does not take account of externalities (e.g. Nove, 1973).
This is of particular importance to the railways, as the transport industries have been described as the externality industries, par excellence (Bonavia, 1954, p.11; Thomson, 1974, p.46). On these grounds, the use of accounting measures in the regulation of these industries has been severely criticised by Nove, who has argued (1973, p.15) that,

"..... if a public authority operating transport services does not take into account the economic (not to say social) effects of its actions, but confines itself to its own profit and loss account..... what conceivable reason can there be for putting transport under public ownership? Who has ever doubted that transport, of all things, has external effects?"

Within the transport industries, B.R. is at the forefront of this issue as it is a nationalised industry which is frequently deemed to have wider obligations of a 'social' or 'environmental' nature, as noted in chapter 4 above. Also, specifically in relation to the railways, Nove has argued (op.cit., p.26) that,

"the measure of their (the railways) efficiency is dissociated from the very purpose of their existence. Or rather it is assumed that the railways' accounts will reflect the degree to which they are carrying out its purpose."

As an alternative, Nove has advocated the abandonment of the concept of the 'commercial' operation of the nationalised industries (op.cit., p.132 and passim) and the incorporation of externalities in their decision making (op.cit., p.133), specifically by the wider use of cost benefit analysis (op.cit., p.137). Such suggestions, if implemented, would further reduce the credibility of existing measures
of profit or loss in the eyes of its critics. This raises the possibility of a measure of 'social profit or loss'. This notion has been supported by B.R. which has not only criticised the usefulness of its profit or loss because of the incidence of externalities (B.R., 1970, p.7), but has also proposed the adoption of a measure of 'social surplus' as a surrogate and has intimated its intention to develop such a measure (B.R., 1976a, 1977). Indeed, a former chairman of B.R. has suggested that, under such a system, B.R.'s financial deficits would be converted to a surplus because of the benefits the railways confer which do not appear in 'the normal railway accounts' (Marsh, 1974, p.200).

2. THE MEASUREMENT OF 'SOCIAL PROFIT OR LOSS': A THEORETICAL IDEAL

Three, quite distinct, views are prevalent regarding the treatment of externalities: (a) the creation of property rights

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1 This has been advocated by a number of 'social' or 'socioeconomic' accountants (Beams and Fertig, 1971; Dilley, 1972; Dilley and Weygandt, 1973; Parker, 1971). However, reservations have been expressed on the purpose of such measures (Cook et al., 1974); on the standards of available measures of social costs and benefits vis-à-vis those of existing financial accounting data (Linowes, 1973); and on the identification of social benefits (Dewhurst, 1973). Nevertheless, this paper seeks to examine whether there is potential for the integration of social costs and benefits into a single measure or index of social profit or loss, or whether this is illusory.

2 It appears that these views are shared by other national railways, for example, those in South America (see Dodgson, 1981).
(favoured by the Austrian\(^3\) school); (b) the use of a Pigovian tax system; and (c) cost-benefit analysis. The first school of thought maintains that externalities can be taken account of by the identification of the parties affected, the establishment of property rights and the negotiation of financial compensation. The second approach would resolve the issue of external effects by imposing taxes on firms which give rise to social costs and by providing subsidies for external benefits conferred, thereby 'internalising' externalities. Both of these approaches to the treatment of externalities are compatible with the existing means of measuring profit or loss: neither requires its replacement or modification.

Indeed, only the third method of treating externalities, cost-benefit analysis, results in firms incorporating valuations of

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3 So named after the country of origin of its earliest and most famous proponents, such as Hayek and Von Mises.

4 Thus its advocates have refuted the existence of famous examples of external effects, as propounded by welfare economists. Pigou, for example, cited two frequently-quoted instances of social costs: (a) the smoke from a factory chimney polluting a local community and (b) the sparks from trains setting fire to crops close to railway lines. However, Coase (1960) demonstrated that such 'external effects' could be internalised by the establishment of property rights, thus permitting the legal settlement of claims. Also, anti-pollution legislation, re. (a), and technological changes, re. (b), have made it possible to eliminate such 'social costs'. Furthermore, perhaps the most famous example of a social benefit is that cited by Meade: the relationship between beekeepers and owners of apple orchards. In this case, it was asserted that bees feed on apple blossom (thus providing honey) and that they pollinate the trees to enable apples to grow. However, Cheung (1973) and Johnson (1973) have demonstrated that there is no market failure in this case; that such producers are frequently located close together intentionally; and that they enter into contractual arrangements to compensate for mutual benefits received.
external effects within an alternative decision-making framework to conventional financial measures. This is the approach which is examined here as a possible means of providing a measure of B.R.'s 'social profit or loss'.

As a starting point, the following identity represents an ideal measure of the net social benefit or cost ('social profit or loss' in our terminology), \( Y_s \), of B.R.'s activities, where, for illustrative purposes, private and social costs and benefits are segregated:

\[
C + (K_{t_1} + K'_{t_1}) - (K_{t_0} + K'_{t_0})
\]

where

\[
C = \text{the maximum possible consumption consistent with the maintenance of capital,}
\]
\[
K_{t_1} = \text{the value of expected net private benefits from B.R.'s operations at time } t_1,
\]
\[
K_{t_0} = \text{the value of expected net private benefits from B.R.'s operations at time } t_0,
\]
\[
K'_{t_1} = \text{the value of expected net social benefits from B.R.'s operations at time } t_1,
\]
\[
K'_{t_0} = \text{the value of expected net social benefits from B.R.'s operations at time } t_0.
\]

This is the familiar economists' concept of income, plus the addition of a measure of B.R.'s 'contribution to society', as expressed by its external costs and benefits \((K'_{t_1} - K'_{t_0})\). The practical defects of the economists' income model are well known - the subjectivity of the choice of discount rate; the identification of costs and benefits and, above all, the difficulties of forecasting their values - all of which inhibit its acceptance by accountants relative to other,
competing income measures. However, the magnitude of these estimation problems is further increased if we introduce the measure of \((K'_{t_1} - K'_{t_0})\). The problem of the identification of benefits is exacerbated, given the lack of a market place to reveal them. In any operational means of measuring such external effects, therefore, an arbitrary limit is inevitable in the selection of those which are to be taken into account. The measurement of these external effects is also greater, given the lack of market prices and the need to establish surrogate or shadow prices.\(^5\) The estimation of the appropriate discount rate is also of a higher order of difficulty than in the case of private costs and benefits. Operational measures of cost of capital exist in the private and public sectors of the economy; however, the appropriate discount rate to apply in the measurement of net social benefits is the social time preference rate (Feldstein, 1964). If strictly interpreted, this rate is unattainable, given the need to establish the preferences of present and future (i.e. unborn) generations. However, even if the present generation is allowed to establish this discount rate on behalf of future generations, there is no unique discount rate (Somers, 1971).

These problems appear to be insurmountable; however, the fundamental issue is one of measurement. By focussing on the

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\(^5\) Strictly speaking, given the origins of cost-benefit analysis in static welfare economics, market imperfections of factors of production should be adjusted to arrive at the exact 'net social benefit'. This implies additional private costs where factors of production have been inadequately compensated and a reduction of private costs where such factors have economic rents. Similarly, additional benefits accrue to an organisation where there exist consumers' surpluses.
measurement of external effects and setting aside the estimation problems associated with the discounting approach (i.e. selection of the discount rate, establishing values of external effects many years ahead), a more pragmatic measure of 'social profit or loss', consistent with existing financial statements might emerge. However, even when the need for these components of this 'ideal' measure of 'social profit or loss' is relaxed, major estimation problems remain. The likelihood of incorporating such measures of external costs and benefits in existing financial statements is examined in the following section.

3. THE MEASUREMENT OF 'SOCIAL PROFIT OR LOSS': AN APPROXIMATION

The potential for devising a measure of social profit or loss, which falls short of the theoretical ideal of the cost benefit analysis proponents, but which is compatible with present measures of profit or loss, is assessed in two parts: (i) the valuation of social costs and (ii) the valuation of social benefits. The combination of these two sets of adjustments with conventional accounting information would provide a computation of 'social profit or loss'.

As regards social costs, it is shown below that the existing costs charged against B.R.'s profit and loss account might serve as an adequate approximation to the 'full cost' (i.e. both private and social) of B.R.'s operations. This is supported by statistical evidence which suggests B.R.'s social costs are slight. It is
further supported by arguments which suggest that, not only might such costs already be reflected in market prices, but also that, even if they are not, the estimation problems are so formidable as to inhibit the derivation of useful measures of social cost.

As for the measurement of external benefits, there are two major findings. In the first instance, there is a category of social benefits which would only apply if the railway was state-owned. This refers to attributes of the railway which are perceived as 'social benefits' by the Minister of Transport. These could be incorporated within the reported financial results of both the railway operating company and the infrastructure company which were proposed in chapter 2. The greatest potential for their measurement (contrary to the viewpoint of Nove) lies with the retention of state industries as commercial organisations. However, it is arguable if these might genuinely be classified as social benefits. Secondly, there is a genuine external benefit which is primarily associated with the provision of railway infrastructure. As noted in chapter 2, the absence of a system of road pricing is a major imperfection of the market for transport systems. As a result, an externality exists in the provision of railway infrastructure. However, the measurement of this benefit (of the entire railway infrastructure) only seems possible by political processes. Nevertheless, the existing measure of profit or loss for the proposed railway operating company would therefore provide an approximation to 'social profit or loss'.
(i) Social costs

It was noted earlier that the identification of external effects can pose a major obstacle to the derivation of a social profit measure. In this section, the social costs which are assessed are those promulgated by B.R. as being of most relevance to its operations (B.R., 1976a; B.R., 1976b), specifically, (i) the use of scarce energy resources (ii) the creation of noise and (iii) causing serious injury and loss of life. ^6 Statistical evidence

^6 There has been no substantive study of the possible social costs incurred by the railways other than this. Most of the previous cost-benefit analysis studies of B.R. were carried out by the Ministry of Transport in the 1969-73 period, when individual branch lines threatened with closure had to show a net social benefit or be closed (see Leitch (1978), Appendix H, for the 32 lines so examined). Prima facie, these studies support the contention that social costs (such as noise, (lack of) safety and (inefficient) energy usage) are slight for railway operations, as these costs are not included in such studies. It is possible, of course, that such costs proved so nebulous as to merit exclusion, but there is no mention of this. See, for example, Else and Howe (1969); Ministry of Transport (1969); Sugden (1972). The external effects included in such studies (i.e. employment of workers with a zero opportunity cost, avoidance of congestion on roads by having a rail option, time savings of travel by train relative to competing modes) are discussed elsewhere within this chapter. Nevertheless, the social costs reported upon by B.R. are consistent with the key external costs of transport, as identified in the literature (see, for example, Roskill, 1974; Independent Commission on Transport, 1974, as discussed in Lapsley (1981)).
suggests that these social costs are slight for B.R.\textsuperscript{7} Also, they pose considerable measurement problems. These difficulties can conveniently be examined by classifying the abovementioned social costs as 'consumer' and 'producer' effects. The use of scarce energy resources by B.R. is the sole 'consumer' effect: both the noisiness of its operations and any resultant deaths or serious injuries from its operations are clearly 'producer' effects.

\textsuperscript{7} Safety: over the period 1953 to 1971, the number of deaths from rail transport were substantially less than those by road per thousand million passenger miles travelled, with a maximum of 36.3 percent of the road death toll in 1957. Similarly, for serious injuries per thousand million passenger miles travelled, rail travellers suffered, at worst, 6.25 percent (again in 1957) of those in road accidents (p.299, Independent Commission on Transport, Pan, 1974).

Noise: surveys uphold the view that rail is the least noisy of transport modes. In a 1961 survey of Inner London, 36 percent of the sample stated that they were disturbed at home by road traffic noise, but only 9 percent and 5 percent respectively were disturbed in this way by air and rail noise. (The London Noise Survey, in Committee on the Problem of Noise: "Noise, Final Report", Cmnd. 2056, H.M.S.O., 1963). Changes in technology have not altered this in the intervening years: a 1974 survey suggested road traffic was the most serious cause of noise in the United Kingdom (Noise Advisory Council, Noise in the Next Ten Years, H.M.S.O., 1974). This source of noise was found to disturb more people than all the other sources of noise combined.

Energy: at a time of shortage of petroleum, rail is the most efficient user of this energy source, as measured by the numbers of miles passengers can travel or tons of goods are carried per mile, for a given amount of fuel compared to other modes (p.295, Independent Commission on Transport, op.cit.).
(a) Social costs: B.R. as a consumer

To date, the main focus on the measurement of externalities has been in the area of 'producer' effects. No successful attempt has been made, to the best of this writer's knowledge, to develop a surrogate measure to replace market prices for energy in a cost-benefit analysis. Davidson (1963) has argued that such a measure is unnecessary, as oil producers price in a socially optimal fashion, fully reflecting the private and social costs of the depletion of this scarce resource. Nash (1976) questions whether a commercial enterprise can achieve the socially optimal rate of depletion when it uses the market rate of discount rather than the social time preference rate. However, the accurate use of the social time preference rate of discount requires an accurate estimate of existing oil reserves and other available energy sources, now and in the future, plus (as noted earlier) an estimate of the value present and future generations would attach to these various energy sources. Nash (op.cit., p.27) himself concedes that the first estimation means 'it is difficult to reach any firm conclusions on the seriousness of the problem', and (op.cit., p.30) that 'long run forecasting on the scale necessary to estimate such shadow prices is in its infancy and is a controversial and hazardous business'. If these reservations are combined with the second estimation problem, which requires reference to be made to these (inestimable) reserves by unborn generations, it is evident why no such surrogate for market price exists.
(b) Social costs: B.R. as a producer

As for B.R.'s other social costs, attempts have been made to devise measures of them. However, it is most important to note that these measures have been devised for, and applied to, circumstances of potential change, such as the siting of a major new transport facility. It is quite a different matter to attempt to use the same procedures for existing facilities, in which case these 'external effects' can be internalised by existing market prices. This is best analysed in relation to the party or parties affected by the externality. Noise is considered, first. The persons most directly affected by noise generated from transport operations are those in close proximity to the transport facility - the railway lines or stations, roads, airports. The fact of their continued residence next to this facility is perhaps best explained by Cheung's (1978, p.37) analysis that 'noise' as a by-product of the transport system is but one of a set of costs and benefits which are reflected in the price system. The persons affected, he argues, would have changed their residence if the social cost of enduring exposure to this noise had made them worse off, i.e. the benefits of close proximity to a transport facility and cheaper housing might offset the cost of noise, in which case, therefore, there is no social cost. Similarly, Walters (1975, p.118, p.143) has argued that the price system is capable of fully reflecting noise in the 'market for quiet',

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as expressed by changes in property values. Those who reject the Cheung: Walters viewpoint are faced with the intractable (and highly questionable) alternative of measuring this social cost. This would require the segregation of that part of the change in values of the relevant properties which could be attributable to 'noise' from nearby railway operations, for inclusion in railway accounts.

The most likely method of eliciting such information, survey techniques, would not provide sufficiently objective information to be incorporated in B.R.'s accounts. Such techniques represent a poor proxy for the revealed preference of the market place. Their major drawback is the potential for respondents to bias the results where he/she stands to gain or lose by his/her stance. This might even arouse expectations of action to be taken in the shape of actual compensation or in reduction of noise. This would be exacerbated in the case of integration with financial statements, where an annual measure of (presumed) loss of welfare would be necessary for B.R.'s accounts. There is also the distinct possibility that such an exercise would be costly and impracticable, outweighing the dubious benefits of the information obtained.

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8 These views are substantiated by empirical studies. Thus Crawley (1973), in an examination of the effect of the construction of a new airport on surrounding properties, showed that the prices of such assets are responsive to such major changes in the environment. Furthermore, Nelson (1980), in a review of 13 empirical studies covering the siting of 18 different airports, constructed a noise depreciation sensitivity index, as advocated by Walters (1975). This revealed that 'noise discounts' accounted for differences in the value of properties exposed to different degrees of noise.
This leaves the social cost of serious injuries and loss of life sustained through B.R.'s operations. In any attempt at the valuation of this social cost it is inappropriate to include regular travellers. As Mishan (1972, p.165) puts it, such travellers have voluntarily assumed the risks attaching to particular transport modes and must, therefore, believe themselves to be better off as a result. Also, of the two commonly accepted bases of valuing lives lost, 'gross' and 'net' output, the latter, which is the more controversial, is the appropriate method. That is, as income measurement is an ex post activity, with no prospect of saving these lives, the loss to society is measured by the difference between what the victim would have produced, if he/she had survived, (approximated by the present value of expected gross earnings) and what he/she would have consumed. A major difficulty with this valuation procedure is the negative values it assigns to members of society (i.e. the value of consumption saved), who have little or no gross earnings. This includes housewives, schoolchildren, pensioners, the permanently disabled. If these categories of victims formed the main component of B.R.'s occasional travellers involved in serious accidents, B.R. might have conferred a social benefit rather than imposed a social cost by their death or serious injury. Indeed, this type of nonsensical result has discredited the accounting approaches to the measurement of human capital, which are being superseded by more theoretically appropriate ex ante approaches based on the probabilities of reducing the risk of death.

Thus, the human capital approach to the valuation of life and serious injury has been rejected by Mishan (1972, Chapters 22 and 23),
a noted proponent of cost-benefit analysis, on the grounds that its only advantage is its ease of application. Furthermore, Mishan has argued that the only economically justifiable approach, in terms of the Pareto principle, is an \textit{ex ante} approach derived from consideration of the value the potential victim places on his/her life. The human capital approach fails to take account of the value of his/her life to the potential victim. It therefore contradicts the conceptual basis of cost-benefit analysis by failing to permit an assessment of the effects of changes in social welfare, to determine whether all members of society are as well off as possible. As an alternative, Mishan has proposed a valuation method based on what each member of the community is willing to pay, or to receive, for an estimated change of risk in the likelihood of death or serious injury. Similarly, Jones-Lee (1976) has proposed such a system, in which the potential victim is prepared to give up as a maximum the sum, $v$, if he has the opportunity to reduce (his own subjective) probability of death during the current period from $\bar{p}$ to $p(<\bar{p})$. The value $v$, is obtained from the following expression:

$$(1 - p) L (\bar{w} - v) + p D (\bar{w} - v) = (1 - \bar{p}) L (\bar{w}) + \bar{p} (D \bar{w}),$$

in which $L(\bar{w})$ is the individual's utility of wealth function, conditional on survival during the period and $D(\bar{w})$ is his/her utility function, conditional on death during the period. These approaches appear to offer potentially more rewarding means of resolving this problem. However, not only are they \textit{ex ante} methods, but they are
also reliant on survey methods which use hypothetical questioning techniques to provide actual values. Both of these factors make such approaches incompatible with the search for suitable \textit{ex post} accounting measures.

In sum, of the social costs which B.R. perceives as being of importance to its operations, these are either already reflected in existing market prices (and therefore, private cost approximates social cost), or no suitable measure is available to allow the incorporation of an additional social cost in B.R.'s profit and loss account. Even if the Cheung viewpoint (that such costs are frequently 'internalised' within the existing price structure) is refuted, it is questionable if it is worth estimating them, given both the problems of estimation and the statistical evidence which suggests they are insignificant for B.R.'s operations (i.e. private costs do approximate to social costs).

(ii) Social benefits

There are two basic categories of social benefit at B.R.: (a) alleged externalities associated with the status of this corporation as a nationalised industry and (b) those arising from the imperfect operation of the price mechanism for transport. The nature of such external effects and their potential for measurement and incorporation within an approximation to 'social profit or loss' are examined, in turn, below. This assessment reveals that, while the first category can be readily incorporated within such an approximation, reservations might be expressed as to whether these aspects of having railway
services can genuinely be classified as 'social benefits'. Also, it is shown that the second category does indeed constitute an external benefit. However, as noted earlier, this is a benefit which relates primarily to the infrastructure and which is indeterminate other than as a theoretical ideal or by political processes.

(a) Social benefits: the railways as a state industry

The type of 'social benefit' in the first category is related to aspects of Government macro-economic policies. This might include, for example, the furtherance of 'full' or regional employment policies and the redistribution of income. The identification, measurement and evaluation of these benefits derived from the railways can be achieved by a re-examination of the nature of B.R. as a nationalised industry. Nove has suggested the abandonment of the concept of nationalised industries as commercial enterprises: in his view they should regard themselves as 'social corporations'. However, this would reverse a Government policy towards nationalised industry which has built up over decades. The notion of nationalised industries as commercial public corporations, on the one hand, and central government departments and Ministers advising them on their 'wider obligations' (social benefits), on the other hand, is essential to this policy. Nove's proposals would involve a devolution in the

9 For a lucid exposition of such effects, see Coombes (1971), particularly pp.35-53.
locus of such judgements to nationalised industries from their political masters. It is questionable to what extent a non-elected board of directors can, or would be willing, to represent the views of the general community. It is also arguable that such a course of action is necessary. The reconciliation of the apparent contradiction in the commercial basis of B.R.'s financial statements and its obligations to comply with the Government's interpretation of the external benefit it confers on society is, in fact, more tractable than Nove and like-minded critics of the 'commercial' public corporation would suggest.

Since 1967, the mechanism has existed whereby the effects of this form of externality can be incorporated within existing accounting measures. In its White Paper of that year, the Government accepted responsibility for the effects of nationalised industries complying with Ministerial directions which were against their own commercial judgement. Thus, the railways received £27 million in 1972 from the Government as compensation for the effects of price restraint; £553.2 million from 1969-74 for the non-closure of financially unremunerative lines and £3,272 million from 1975 to 1981 for its entire passenger services. Other nationalised industries

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10 Para 37, p.14, Cmnd. 3437, Nationalised Industries: A Review of Economic and Financial Objectives, 1967. Prior to this, the best the affected nationalised industry could hope for was an adjustment of its financial objective (paras 31 and 32, Cmnd. 1337, The Financial and Economic Obligations of the Nationalised Industries, 1961).
have also received such payments. The ability to account for these external effects in this fashion has been reinforced by the proposals contained in the 1978 White Paper on the nationalised industries. These state the need for Ministers to provide nationalised industries with specific guidance, which sets out the reasons for the direction and the additional costs which would be incurred by the industry in its implementation. It was envisaged in the 1978 White Paper that these statements of guidance would be submitted to Parliament for its approval. The introduction of these proposals should make the reasons for Ministerial intervention more explicit and further improve their incorporation in financial statements.

As an example of how this might operate, consider the possibility that B.R.'s labour force might be higher than B.R. desire because of a Ministerial direction in line with Government 'full' or regional economic policies. If it could be shown that no alternative employment opportunities existed for these railway workers, the cost

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11 e.g. British Airways (as B.O.A.C.) received £25 million in 1968/69 to cover the additional cost of purchasing British aircraft which were not its original choice; British Gas received £74.9 million over the three years to 1973/74 for price restraint; The Electricity Council received £41 million over the period 1974/75 for accelerated capital expenditure and carrying excess levels of coal stocks and £26 million for price restraint in the period 1970/75; The National Coal Board has received £230.7 million to cover the cost of industrial disputes and lesser amounts for pneumoconiosis compensation (£60 million) and special redundancy payments (£38 million).

of their employment to the economy would be zero. A suitable approach to the payment of this compensation would be a transfer to B.R. of an amount equal to the labour costs of these 'unemployable' rail workers, which could be credited against railway labour costs, therefore eliminating the effects of this non-commercial obligation. As a further example, if the Minister's action is taken with the intention of redistributing income, this can be effectively reported upon within conventional financial statements. This policy might take one of two forms: (a) underpricing (for example, by refusal or postponement of price increases), in which case, the adjustment to be made is directly comparable to that for compliance with counter-inflation policies, i.e. credit revenue account with earnings foregone; (b) the maintenance of unremunerative passenger services, in which case the adjustment to be made is directly comparable to that for directions to nationalised industries to purchase equipment which is not their first choice, i.e. credit revenue account with excess operating costs. In either circumstance, the cost of these Ministerial directives are compensated by Government. This has the benefit of segregating those elements of B.R.'s operating costs which are controllable, consequently providing a better yardstick of accountability for both B.R. and the Government. This approach also meets the criteria of providing objectively prepared, verifiable accounting information. This is

13 This assumes unemployment benefits approximately equal average wages paid to railway workers.
particularly so if the 1978 White Paper approach of explicitly stating the aims, assumptions and costings underlying such Ministerial directives are made public by announcement to Parliament. However, it is important to note that all of this merely refers to the accounting arrangements for such Ministerial directions. It is in no way intended to argue that such courses of action ensure optimal resource allocation. This is merely a recognition of the present realities of governmental: nationalised industry relationships. Indeed, if policies were designed to redistribute income to B.R. customers they would be entirely inappropriate. As B.R.'s travellers tend to have higher incomes, the (assumed) aim of the equitable distribution of income in society would regress under such schemes (see Pryke and Dodgson (1975) pp.194-197). Furthermore, the use of the nationalised industries as an instrument of income distribution is an inefficient means of achieving this aim. There is the drawback mentioned above, that those who benefit by such policies might not be among the intended group of persons whose real incomes are to be raised. Also, a 'deadweight' loss, equal to the difference between the cost of resources consumed, on the one hand, and the price paid plus the consumer surplus on the other, is likely to be incurred by this policy (see, for example, R. Rees, (1979) pp.15-17). Also, at the level of the total economy, if nationalised industries pursue such policies and produce less marketed output than they consume, this means that they are consuming part of the surpluses of the company sector of the economy, at the expense of genuine social
services, such as health and education, which have no marketed output at all. (See W. Eltis, (1979), p.18.) Indeed, the most recent White Paper acknowledged these inefficiencies and gave an assurance that these industries would not be used as a means of redistribution of income in the future. The optimal means of pursuing such policies was accepted as being that of the taxation and social security systems (H.M. Treasury, (1978), p.22, para 54).

(b) Social benefits: the pricing of infrastructure

As for the second category of social benefits mentioned above, this refers to what is conventionally regarded as an externality - a failure of market forces. Thus if B.R.'s persistent financial deficits are a fair indicator of the economic worth of a railway system, there is little more to say. But if markets have somehow misfunctioned, there may be an economic rationale for the retention of the railways. It is suggested here that the absence of a system of road pricing represents such a market failure. Thus, all forms of infrastructure for transport (airports, seaports, railway permanent way) have prices associated with their use,\(^{14}\) with the exception of roads. Therefore, as regards the railways, the maintenance of its infrastructure might result in an external benefit (i.e. one which is not reflected by the willingness to pay of consumers, as indicated by gross receipts), namely, the preservation

\(^{14}\) Although this is never made explicit in the case of the railways, because of the integrated nature of their operations.
of the degree of choice available to society in selecting the transport mode which best reflects its desire for mobility. Thus, dependent on the exact size and configuration of the rail network, its retention would relieve traffic congestion on major roads to, and within, cities.15

The existence of this external benefit depends upon the inadequacies of taxation as a surrogate for the price mechanism. As noted in chapter 2, the system of taxes - road fund tax per vehicle, plus excise duties on petrol - does not and cannot constitute a pricing system. A price is a function of the interplay of the forces of supply and demand, which, in this case, would thereby determine the level of usage of the road system. The existing taxes are administered

15 The decision on the exact configuration of the rail network might also be used to maintain rail links in rural areas. This represents a possible social benefit. The measurement of such (possible) social benefits might be achieved by the re-introduction of the cost-benefit analysis of branch lines, as proposed in the 1968 Transport Act. However, in general, such studies found that rural services had a net social cost, rather than a net social benefit (see, for example, Pryke and Dodgson, op.cit., pp.197-199; also, Leitch (op.cit.)). The failure of such rail links to make a surplus, even in terms of social costs and benefits, makes it unlikely that a privately-owned railway operating company would wish to provide such services, even if the railway infrastructure company was willing to provide a permanent way. However, these services might be provided by a state railway operating company, with subsidies covering the operating deficit in a manner analogous to the social benefits discussed in section (ii) (a), 'Social benefits: B.R. as a state industry', above. Alternatively, such services might be provided by local transport organisations, such as Passenger Transport Executives, and financed locally.
by central government, they are not determined by the market and, therefore, by definition, do not constitute a price. As a result, it is unlikely that they will result in an optimal or efficient allocation of resources between the different parts of the infrastructure, save coincidentally.\textsuperscript{16}

One possible solution to this, as noted in chapter 2, would be the introduction of some system of road pricing. Indeed, this has been frequently advocated - see, for example, Roth (1967), Munby (1968) and Foster (1975). However, this has proved politically unacceptable. A further possible solution is the attempt to devise a surrogate for road pricing. The principal proposed refinement of this nature has been a congestion tax, as a possible means of relieving road congestion, the major dysfunctional consequence of not having a road pricing system. Thus, the existing, admittedly

\textsuperscript{16} The absence of a system of road pricing is exacerbated in the case of certain private motoring because of the indivisible nature of other costs of motoring. Thus, insurance, fuel and maintenance costs are diverse and irregular in relation to vehicle use. Indeed, the potential traveller might even perceive a zero opportunity cost of vehicle usage because there is no explicit price available as a basis of comparison between modes. However, the potential importance of this 'zero price effect' is restricted to private motoring. Thus it is not applicable to road freight, in which a price is paid for the carriage of goods nor does it apply to public transport services (bus, train or plane), in which their most immediate benefit - time savings - can be reflected within existing price structures. For example, as a simple illustration, a £75 one hour trip by air is comparable to a £25, three hour trip by train, if the average earnings of regular travellers approximates £25 per hour. Additional adjustments may or may not be made for such items as superior comfort (1st v. 2nd class travel) and different times of travel (peak v. off peak).
imperfect, administrative systems might be improved by the introduction of this additional, quite different, tax. This proposal is most closely associated with the work of the Smeed Report (1964). As a partial attempt at road pricing, this fails to provide the benefit of a truly comprehensive pricing system and, in itself, is also politically unacceptable. Transport Ministers and Governments of different political complexions have favoured adjustments to existing administrative devices, rather than the implementation of such radical proposals.

Therefore, the external benefit of railway infrastructure (i.e. the easing of congestion on roads) for which it receives no payment from road users who benefit, is liable to persist. Indeed, the reluctance of Governments to implement a system of road pricing was one of the reasons cited for the segregation of railway operating services and railway infrastructure in the proposed reconstruction of chapter 2. It was stated there that the absence of road pricing is likely to increase the usage of roads, relative to rail and that a railway infrastructure deficit would result. As a consequence, this segregation is necessary, lest inefficiencies of the operating services (for which no distinct external benefit is evident) are hidden by subsidisation of infrastructure deficits. This reaffirms the fundamental differences between these two aspects of the railways. It also supports the profit objective for the railway operating company, on the grounds that its private costs are a satisfactory approximation to its 'full' (private and social) costs and its
revenues are an accurate measure of its benefits, in the absence of external benefits.\textsuperscript{17}

However, there remains the question of how to measure the external benefit (and, thereby, the size of subsidy to be paid) of the railway infrastructure company.\textsuperscript{18} The most evident approach is the application of a formal cost-benefit analysis, in which the subsidy payment would be equal to the net social benefit.\textsuperscript{19} Indeed, this has been advocated for the existing subsidy payments to British Rail (Dodgson, 1981). However, the social costs of railways are slight, as noted above. Therefore, this cost-benefit analysis would be directed at the valuation of the social benefits which accrue from the existence of the railway infrastructure.

\textsuperscript{17} But see footnotes 5, 10 and 15 above, which might require adjustments to the existing measure of profit.

\textsuperscript{18} This issue is only briefly considered here as this thesis is principally concerned with the railway operating services. However, for a fuller discussion, see Lapsley (1981), pp.539-540.

\textsuperscript{19} It might be argued that cost-benefit analysis is not the only means of determining the extent of such subsidisation. Two frequently used techniques, in the absence of available market prices are (a) surveys and (b) observations of consumer behaviour. Option (a) would require a national survey (say) once a year to determine the amount which the nation would be 'willing to pay' to subsidise railway infrastructure. The defects of such surveys have been discussed in the main text, but it might be added that their cost is unnecessary, if the electorate is willing to accept the views of their elected Government on the magnitude of such subsidisation. As for option (b), this is generally confined to small scale studies. The scale of a comprehensive study of the nation's travelling habits is one reservation which can be expressed about this option. Also, the inferences which might be drawn from such a study are dubious. In particular, this is true of any such assessment (whether of rail or air, relative to road) because of the absence of road pricing.
Furthermore, it is suggested here that the size of such social benefits is indeterminate, other than by political judgement. There are numerous reasons for this.

Thus, the subsidisation of the railways cannot be set aside from other public expenditure, as the act of subsidising one part of the public sector might displace some other, socially worthwhile, activity. At the level of total public expenditure, however, the measurement of social benefits to allow such a comparison is even less tractable than that of the transport infrastructure (c.f. education and health, for example). The possible restriction of cost-benefit analysis to transport alone to ameliorate this problem is incongruous, because the transport budget is itself politically determined.

Also, within the transport budget, there are severe difficulties in inter-modal comparisons. Thus, as regards expenditure on roads, for example, the existing level of cost-benefit analysis is not particularly sophisticated (Heggie, 1979). Furthermore, the systems effects of transport infrastructure are such that there is considerable potential for sub-optimisation from cost-benefit analysis (Georgi, 1973).

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20 As an example of such difficulties, consider the N.H.S. Just as in transport, the major difficulties are associated with the derivation of a measure of benefits. However, as there is no market for its services at all, instead of having an existing (imperfect) price, to which adjustments are made for social costs and benefits, there is no logical starting point for a cost-benefit analysis. This has resulted in considerable research on the measurement of health care output, without the construction of an acceptable general index. See, for example, Fanshel and Bush (1970); Rosser and Watts (1972, 1978); Black and Pole (1975), as discussed in Lapsley (1981).
As a consequence, the determination of the infrastructure subsidy must be made by Government. The size of this subsidy will therefore be a measure of the Government's willingness to pay on behalf of existing and potential users of transport services for the preservation of a 'right of access' to the railway infrastructure.

4. CONCLUSION

A number of influences (Government, academics, the industry itself) have suggested that financial profit or loss is too narrow to represent a satisfactory objective for the railways. Indeed, it has been suggested that the financial deficits of the railways need not be a source of concern, as these are more than compensated for by social benefits. These views have pointed towards the need for the development of a measure of 'social surplus or loss' for the railways.

This chapter has sought to answer the question of whether such a measure is illusory or not, in two stages:

1. In the first stage, it was noted that an 'ideal' measure of the net social benefits of the railways is conceptually appealing to some, but it is of little practical relevance. This stage therefore suggested that the construction of an index of 'social profit or loss' for the railways is illusory because of measurement difficulties.
2. In the second stage, a relaxation of the requirements of the theoretical ideal (particularly the need to provide estimates of variables many years ahead) was made. This discussion examined (i) social costs and (ii) social benefits, in turn. As regards social costs, it was shown that, not only are these of limited importance, in statistical terms, for the railways, but also that, in any event, their measurement presents severe difficulties. On this basis, it was suggested that the private costs of the railways might be used as an acceptable approximation to their 'full' (private and social) costs. In the discussion of social benefits, it was shown that there are two categories of such externalities, (a) those which are perceived as being 'social' by the Minister of Transport and (b) those which are related to the transport infrastructure. The first category can be reflected in existing financial statements by making suitable modifications. Doubts were expressed as to whether they might be accurately described as 'social benefits' or not. It was also noted that this category of 'social benefit' is restricted to the state-owned railway. As for (b), this second type of externality arose because of the absence of some system of road pricing. As a consequence of this the market place cannot be relied upon to determine the size of the road and rail networks. This is an externality which justifies subsidisation of a railway infrastructure company, in the absence of road pricing. On the other hand, there is no such external benefit associated with the
railway operating services. Thus, its existing measure of profit or loss (bearing in mind the above findings regarding its 'social costs') might serve as an adequate approximation to social profit or loss.
Chapter 6

ALTERNATIVES TO ACCOUNTING MEASURES: (2) NON-FINANCIAL INDICATORS

In previous chapters, it has been shown that financial objectives, and the need for financial discipline, have always been of importance to nationalised industries (including B.R.), despite the advocacy of pricing policies by welfare economists which would have undermined their significance (chapter 3). Also, it was noted that, at the policy-making level, B.R.'s financial record proved to be a 'trigger' which indicated key changes in U.K. railway transport policy (chapter 4). In chapter 5 (the 'Social Profit' Alternative) it was shown that the continued importance of the financial objective was likely to continue for the reconstructed railway operating company (whether state-owned or private). This was because its financial results (a) already give a reasonable approximation to net social benefits and (b) if this company is state-owned, it is possible to modify its existing financial results to accommodate Government intervention on the grounds of macroeconomic policies (i.e. 'social benefits' as perceived by the Minister of Transport).

However, there is yet another radical alternative, that of non-financial indicators, which, if adopted, would seriously undermine the importance of financial objectives to the reconstructed railway operating company. Thus, the pursuit of a non-financial aim could
conceivably reduce its profitability. Indeed, at one extreme, this policy might entail the incurrence of financial deficits (i.e. if non-financial aims are sought to the neglect of financial discipline). Nevertheless, it is shown below that, while the use of such indicators have frequently been suggested for state railways and other nationalised industries, their usefulness as an aim or as a tool of regulation of the railway operating company is strictly limited.

Thus, the relevance of non-financial indicators is primarily confined to (a) B.R. as a subsidised state industry and (b) the regulation of monopoly. However, it is expected that the reconstructed railway operating services should be operated commercially and, therefore, category (a) above is irrelevant. Also, it is shown that category (b) has only limited potential application for the reconstructed railway operating company. Furthermore, even for this limited application, there are reservations, of a conceptual and a practical nature, over the usefulness of such measures. Indeed, at best such indicators offer a potential means of supplementing, rather than supplanting financial objectives. Three possible schemes of regulation of the railways by non-financial indicators are discussed, in turn, within this chapter:

1. Productive efficiency indicators,
2. Quality of service measures,
3. Volume of service constraints.
1. PRODUCTIVE EFFICIENCY INDICATORS

The potential relevance of productive efficiency indicators to the railways financial objective is examined in two stages:

(a) a consideration of the nature of productive efficiency,

(b) an examination of the uses and limitations of examples of such indicators.

This analysis reveals that there are limitations to the usefulness of such indicators in the regulation of the reconstructed railway operating company (R.R.O.C.).

(i) The nature of productive efficiency

Productive efficiency can be broadly defined as the minimal use of physical inputs to achieve a given level of production or service.\(^1\)

A considerable interest in this concept has arisen because of serious doubts expressed in the literature over a fundamental assumption of economic theory, i.e. that firms organise themselves as efficiently as possible, such that their costs are minimised. A critical influence in the challenging of this assumption has been that of Liebenstein (1966). He argued that many firms do not operate at, or near, their production possibility frontier, but at some lower level of output. He attributed the production of a level of output somewhat less than the maximum attainable by a given organisation to the absence of pressures to be efficient. Liebenstein focussed primarily on the use (and not the prices paid for) production inputs

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\(^1\) This is a broad definition, which suffices for purposes of the present discussion. However, a more precise definition is attempted in section (ii) below.
and the pressures (internal and external) on management to organise efficiently (op.cit., pp.406-407). However, all of these aspects of inefficiency have the end result that costs rise beyond that level required to produce a given output as efficiently as possible. Specifically, he stressed the possible wasteful use of resources in the absence of competitive pressures (op.cit., pp.412-413). He designated the avoidance of such waste X-efficiency.\(^2\) Also, in relation to the nationalised industries, Pryke (1971), in a comprehensive study of their economic performance, argued strongly for the relevance of X-efficiency in any such appraisal.\(^3\) The arguments which he made were the same as those of Liebenstein. They were expressed specifically regarding the railways and also regarding the nationalised industries as a whole (Pryke, op.cit., passim, but see pp.396-398, in particular). Indeed, the importance of X-efficiency is such that it has been suggested that it is not possible to discuss

\(^2\) The designation of X-efficiency was first made by Liebenstein, however, other contributors to the literature have introduced similar concepts. Thus, X-inefficiency has a great deal in common with Cyert and March's (1956) behaviouralist notion of organisational slack, which refers to the non-optimal use of resources, because management only seeks some minimum level of attainment. The Liebenstein concept is also akin to Averch and Johnson's (1962) hypotheses on management behaviour in a regulated firm. Thus, they found that managers behaved non-optimally in organising the productive resources at their command, largely because of the failure of the regulatory process as a substitute for competitive market structures.

\(^3\) In fact, Pryke made no explicit reference to 'X-efficiency', preferring instead to use the term, 'technical efficiency'. However, it is quite clear that what he was referring to was 'X-efficiency'. Thus, he cites Liebenstein as a major reference point for his analysis; he uses nonfinancial indicators (primarily labour productivity): indeed, the very term technical efficiency infers a reference to non-financial matters, and these terms are therefore used interchangeably in the main text.
the regulation of monopoly without taking its potential impact into account (Peacock and Rowley, 1972).

Furthermore, institutional pressures exist in the U.K. which support this line of thought. Its importance in the context of the regulation of nationalised industries has been advocated by the Government in its White Papers of 1967 and 1978, and by the N.E.D.O. (1978), in its report to Government on the regulation of the nationalised industries. While the impetus for these Government recommendations has its roots in the type of arguments advanced by Liebenstein, no reference was made to him, nor to his concept of X-efficiency. Indeed, the interpretation of productive efficiency made by the Government is less narrow, in that it not only emphasises the need for efficiency, but also places considerable stress on cost control.

Thus in 1967, the Government made explicit reference to the need for state industries to make efficient use of resources (particularly by labour productivity), and linked this to the need to control costs (H.M. Treasury, 1967, para 32). Similarly, in its 1978 White Paper (at the prompting of N.E.D.O., op.cit.), the Government recommended the further development of performance indicators. The reason it cited for this was the need to have regular information on the success of nationalised industries in both controlling costs and increasing efficiency (H.M. Treasury, 1978, para 77). It particularly noted the need to have such indicators in situations of monopoly, in which the system of regulation by
financial targets might be undermined by nationalised industries exploiting their market power, i.e. by price increases or by reductions in the level of provision (H.M. Treasury, 1978, para 76).

However, the concept of productive efficiency has potential drawbacks of both a conceptual and a practical nature. The latter aspect is discussed below, in the following section on the uses and limitations of productive efficiency indicators. At this stage, two possible conceptual limitations on the usefulness of productive efficiency indicators are examined. The first of these raises uncertainties over the existence of productive inefficiencies at B.R.; the second suggests that productive efficiency indicators are of limited relevance to B.R. (and, indeed, to the R.R.O.C.).

The first possible limitation relates to the applicability of productive efficiency indicators to the railways, bearing in mind the rationale of 'X-efficiency'. Thus, both Liebenstein and the Government, in its White Papers, stress the need to ensure that there are no productive inefficiencies where there is monopoly. However, while B.R. is a state monopoly, it is certainly not a monopoly in the sense of being the single producer of a product or service for which there is no close substitute. While a state monopoly of rail transport, by its very nature, eliminates intra-modal competition for passenger and freight traffics, it certainly does not dispense with inter-modal competition.

Indeed, there is considerable evidence that the transport market is competitive. An exception to this is the recent report

4 This matter is discussed in depth in chapter 7, below.
of the Monopolies Commission which suggests that B.R. has a considerable degree of monopoly power in the provision of railway commuter services in the South East of England (Monopolies Commission, op.cit.). Since B.R.'s (and, therefore, the R.R.O.C.'s) monopoly power is, at best, uneven, it might be argued (on the basis of Liebenstein's and the Government's analyses) that the existence of productive inefficiencies is also likely to be uneven. On the other hand, it might be argued that, regardless of whether the R.R.O.C. is in a competitive trading position or not, if it is state-owned, it will be insulated from the full rigour of competitive pressures. Therefore, it might very well be that there is already some degree of X-inefficiency at B.R., despite the competitive pressures that it faces. At this stage, the uncertainty over its existence or not is noted and this issue is taken up further in section (b) below.

A second reservation, expressed by Stigler (1976) in a critique of Liebenstein's concept of X-efficiency, is also pertinent to the Government's recommendations on the need for productive efficiency. In essence, Stigler argued that the concept of X-efficiency has an overemphasis on supply. Thus he demonstrated that it concentrates on the maximisation of production, regardless of the value placed on such output by potential consumers. In this way, Liebenstein abstracts from consumer preferences as expressed by the price system. He emphasises the additional output which could be produced if organisations operate at the highest levels of technical efficiency, but this ignores the existence or otherwise of sufficient pressure of demand for such
additional output. Indeed, the singular pursuit of X-efficiency in this way might result in the creation of additional, unprofitable services. Alternatively, it assumes that, in every instance, the organisation under regulation is a monopoly, with an inelastic demand for its product or services. This is clearly not the case at B.R., which has limited monopoly power, as noted above.

However, the above mentioned limitations regarding the potential usefulness of the concept of productive efficiency in R.R.O.C.'s financial regulation and the uncertainty over the existence of X-efficiency at B.R. must be assessed in conjunction with the existence of operational measures of productive efficiency. In the absence of such measures, the case for productive efficiency to be taken into account in railway regulation represents little more than a sterile argument. This issue is examined in the following section.

(ii) The uses and limitations of productive efficiency indicators

The concept of productive efficiency was defined above, in general terms. However, a major obstacle to the derivation of a, or a set of, useful indicator(s) of productive efficiency arises in its operational definition. The difficulties involved are examined in this section in two stages:

(a) the measurement of productive efficiency, and

(b) an appraisal of the performance indicators published by B.R., in line with Government recommendations.
(a) The measurement of productive efficiency

It was noted in the previous section that monopolists might be wasteful in their use of resources. As a result, costs increase beyond that level which would have been incurred if they had been most efficient in the provision of products or services. In this context an uncertainty was raised over the extent to which B.R. might have X-inefficiencies. This was the problem of how much B.R.'s competitive pressures might have eliminated X-inefficiencies, or, indeed, the extent to which nationalisation might have encouraged them. However, this uncertainty over the extent, or, indeed, over the existence of X-inefficiency is not confined to B.R. The generality of this can be seen from the evidence cited by proponents of the pursuit of X-efficiency. This takes two forms: (a) studies of the level of monopoly in the economy. These are accompanied by inferences about the loss to the economy as a whole caused by monopolies restricting output versus the gains to be achieved by all firms eliminating X-inefficiencies. (b) Examples of instances where X-inefficiencies have been found.

The former evidence is not conclusive. Indeed, it has been a matter of dispute for many years. The second aspect of this evidence

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5 Thus both Liebenstein (op.cit.) and Pryke (op.cit.) cite a study by Harberger (1954) as evidence of the importance of X-efficiency in the economy as a whole. However, this conclusion must be interpreted with caution both because of the inferences drawn from this study by Liebenstein and Pryke and also because of the controversy over Harberger's study per se. Thus, both of these writers interpreted Harberger's study as concluding that restriction of output from monopoly is minimal and, therefore, X,efficiency is (contd)
is directly relevant to the problem of identifying existing X-inefficiency at B.R. This evidence represents the findings of one-off case studies, in which some change is made (for example, new management, the adoption of well known technology several years after other firms) and marked increases in output, or reductions in cost, result. This is one of Liebenstein's (op.cit.), principal sources of evidence for X-efficiency. However, in the latter form of evidence, the existence of X-inefficiency is not known until after the event which triggers off the drive to higher levels of productive efficiency. Furthermore, the instances of X-inefficiency cited by Liebenstein were of a sporadic nature. These attributes of the cases of X-inefficiency - its ex post, unpredictable nature - make it difficult to incorporate it in the financial objectives of any firm, regulated or otherwise.

5 (contd)
of the utmost importance. However, there is an inconsistency in this interpretation as the level of X-efficiency (in terms of Liebenstein's arguments) is largely determined by the extent to which external pressures to be efficient exist. Thus, if there is not a significant number of monopolies, this might indicate a relatively competitive economy, which would presumably result in external pressures on management to be efficient. Indeed, Harberger concluded that economists need not "apologise for treating (the U.S.) economy as competitive, for in fact it is awfully close to being so" (op.cit., p.87). Therefore, this suggests that X-inefficiency is not widespread. However, this conclusion must be treated with care. Harberger's study has proved to be contentious. Thus, at the time of Pryke's study, conflicting evidence had been presented by Schwarzman (1960) and Scherer (1970), who both supported Harberger, and by Stigler (1956) and Kamerschen (1966), who discovered significant welfare losses associated with monopoly. Most recently, Cowling and Mueller (1978) have produced evidence which contradicts that of Harberger. Therefore, this type of evidence does not provide conclusive evidence on the importance of X-efficiency.
One means of overcoming this criticism would be the construction of an index of X-efficiency. This could then be utilised to set targets (in conjunction with financial objectives) and their attainment or otherwise might be used as a basis of regulating the R.R.O.C. However, the construction of such an index is an elusive task. Indeed, as is shown below, the measurement problems involved in deriving such an index result in the production of what is, in effect, a crude version of information already present in the profit and loss account.

This can be demonstrated as follows. Thus, if $E$ is denoted as productive efficiency; $O_i$ are outputs; $I_j$ are inputs and an asterisk denotes optimality:

$$E^* = \frac{O_i}{I_j}$$

In this simple formulation of productive efficiency, severe difficulties arise over both the determination of $O_i$ and $I_j$. Under the terms of Liebenstein's analysis, this must provide a signal where resources are being used inefficiently, with the consequent effect that costs are too high.\(^6\) This is a two-stage analysis: (a) an index is required which expresses, in non-financial terms, the level of X-inefficiency and (b) this level of inefficiency is compared with costs incurred, to determine if these are excessive. As regards (a), there are two fundamental drawbacks to the measurement of $O_i$ and $I_j$ on the same scale (unless it is in financial terms), i.e. the heterogeneity of both

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\(^6\) That is, by not spreading costs over a larger attainable output or by using too many resources to achieve the existing output.
inputs and outputs and the vintage of long term resources used as inputs. This applies whether a single measure of $\theta_i$ is sought for passenger services or for freight services or whether a measure is sought for all railway operating services.

Thus, for all railway services, the most evident physical measure of $\theta_i$ is that of 'traffic units', i.e. a simple aggregation of the basic rail statistics of ton miles and passenger miles. However, this is not a meaningful measure of $\theta_i$ as significant differences exist between the two mainstream activities of freight and passenger traffic and within each of these groups. Thus, there is great time and effort involved in loading and unloading freight, which is not applicable to passenger services where the 'cargo' voluntarily embarks and disembarks. Also, the freight statistic of ton miles imports a bias as freight traffic might be expected to be heavier than passenger traffic. Similarly, within these two major activities, there are wide differences. Thus freight has bulk goods such as coal and iron ore, but also sets of individual items of high value, such as motor vehicles. Within the broad category of 'passenger traffic', there are high speed trains, commuter trains; first class and second class travel; peak and offpeak services. As a consequence, freight and passenger traffics can only be usefully combined in £'s, preferably with weights to allow for the different composition of each type of traffic.

Nevertheless, while a physical measure of railway output cannot be meaningfully derived, it might be considered that the financial one might be of use in measuring $E$. Thus, it could be combined with a
measure of $I_j$ which is nonfinancial. In this way, it might permit the construction of an index which could be used to monitor the X-efficiency of inputs. However, the measurement of $I_j$ in anything other than financial terms represents even greater difficulties than that of $O_i$. Thus, of the two principal inputs to railway services, i.e. labour and the use of capital assets, there are substantial differences between and within these groupings which make their aggregation into an overall measure of inputs a dubious exercise.

Thus, a statistic for the labour input, such as man-hours or total number of employees masks the range of different grades of employees utilised on the railways. Similarly, within R.R.O.C.'s capital assets there are evident major differences within rolling stock. For example, the high speed train is obviously quite different in its operating characteristics from shunting vehicles, diesel engines or electric trains. Furthermore, even if the physical aggregation of the use of the principal assets of the railways was possible, this would ignore the vintage of the different assets involved, thereby distorting $E$ from one period to the next.

Overall, therefore, while the proponents of the importance of X-efficiency write as if this is a single, unifying concept, the problems involved in its measurement confound its use in this way. Nevertheless, this does not eliminate the use of productive efficiency indicators from the financial regulation of R.R.O.C. As will be shown in the following section, a more pragmatic interpretation
of productive efficiency has evolved in response to Government pressure on state industries. While the indicators constructed for this purpose are not without defects, they do point the way to a means by which tighter regulation of the R.R.O.C. might be achieved.

(b) B.R.'s existing performance indicators

The performance indicators published by B.R., in line with Government recommendations, are now examined. These are set out in table 6.1, in a classification which highlights their financial and non-financial aspects. It is shown below that, in effect, both the financial and the non-financial indicators in that table represent a summary of B.R.'s profit and loss account. This examination is in two stages. First of all, the relationship of the performance indicators to B.R.'s profit and loss account is observed. After this, the means by which B.R.'s non-financial indicators might be integrated with B.R.'s financial objectives is explored. This includes consideration of defects in existing indicators, the potential for their improvement and the implications of such changes for the regulation of B.R.

The indicators in table 6.1 might be described as follows. The financial ones provide a summary of key aspects of B.R.'s profit and loss account. Thus, as regards the passenger services (1) is a measure of passenger receipts; (2) and (3) are measures of the magnitude of B.R.'s subsidy; (4) and (5) relate to operating costs. Similarly for freight services, (6) is a measure of freight receipts; (7) and (8) are measures of freight operating costs. Finally,
Table 6.1 British Rail's Performance Indicators*

<table>
<thead>
<tr>
<th>Service Indicator</th>
<th>Operating Services</th>
<th>Permanent Way</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(a) Passenger</td>
<td>(b) Freight</td>
</tr>
<tr>
<td>Financial</td>
<td>(1) Average fare per passenger mile</td>
<td>(6) Freight revenue per wagon</td>
</tr>
<tr>
<td></td>
<td>(2) P.S.O. &quot;contract&quot; payment per passenger mile</td>
<td>(7) Train running and terminal costs per loaded train mile</td>
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<td></td>
<td>(3) P.S.O. &quot;contract&quot; payments as a percentage of Gross Domestic Product at Factor cost</td>
<td>(8) Revenue per £1,000 of paybill costs (Rail and Rail Workshops)</td>
</tr>
<tr>
<td></td>
<td>(4) Passenger business direct costs per loaded passenger train mile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5) Revenue per £1,000 of paybill costs (Rail and Rail Workshops)</td>
<td></td>
</tr>
<tr>
<td>Non-financial</td>
<td>(12) Passenger miles per loaded passenger train mile</td>
<td>(17) Average wagon load (all traffic including Freightliner and N.C.L.)</td>
</tr>
<tr>
<td></td>
<td>(13) Passenger trains arriving on time, or less than 5 minutes late, as a percentage of total passenger trains</td>
<td>(18) Net tonne miles per loaded freight train mile</td>
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<tr>
<td></td>
<td>(14) Passenger trains cancelled as a percentage of current timetable services</td>
<td>(19) Loaded train miles per train crew member (i.e. freight and passenger)</td>
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<tr>
<td></td>
<td>(15) Loaded train miles per train crew member (i.e. freight and passenger)</td>
<td>(20) Net tonne miles per member of staff employed (Rail and Rail Workshops)</td>
</tr>
<tr>
<td></td>
<td>(16) Passenger miles per member of staff employed (Rail and Rail Workshops)</td>
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</tr>
</tbody>
</table>

items (9), (10) and (11), for permanent way, round off the remaining costs of railway operation.

As for the non-financial indices, these might be seen as (approximate) mirror images of certain of the previous financial indicators. Thus, as regards passenger services, non-financial indices (12), (13) and (14) (which relate to the average number of passengers carried per train (12), to the punctuality (13) and to the reliability (14) of services), provide insights into the nature of passenger receipts and items (15) and (16) can be related to the major operating cost of labour. Also, for the freight services, non-financial indicators (17) and (18) (which relate to the tons carried per train (17) and to the efficiency (18) of its carriage), can be related to freight receipts. Non-financial indicators (19) and (20) for freight services can be related to labour cost. Finally, the effective utilisation of routes (indicated by (21), the single non-financial indicator relevant to permanent way) can be related to the costs associated with permanent way.

In this examination of how these indicators might be of use to a regulatory authority, the primary focus is on the efficient utilisation of inputs in the provision of whatever volume of services is actually achieved. Thus, the potential contribution of indicators relating to the quality of outputs (such as the non-financial indicators of the punctuality and reliability of passenger services) is merely noted at this stage. This is not because it is believed that they are unimportant, but because they, of themselves, are evidently an incomplete measure of the quality of railway passenger services and also because this topic is discussed, at some length, in section (2) below on 'Quality of Service' Measures.
As for the remaining non-financial indicators in table 6.1, these should be of interest to a regulatory authority which is intent on the elimination of productive inefficiencies, as they provide information on the use of the key inputs of labour and capital. However, there is a major drawback to the use of these indices as devices by which tighter financial regulation might be achieved at B.R., and, indeed at R.R.O.C. In practice, these indicators lack sufficient detail to be of use other than in affording a regulatory authority very broad guidance on railway operations.

Thus, as regards labour inputs, non-financial indicators (16) and (20) imply that, for a given level of output (passenger miles/net tonne miles), the precise size of labour force required is known. However, the approximate nature of these indicators suggests otherwise. In the first instance, indicators (16) and (20) use total staff employed as their measure of labour inputs, but this fails to distinguish between the different types of labour employed at B.R. Furthermore, as total staff employed is used as the measure of labour inputs in both (16) (for passenger) and (20) (for freight), these indicators fail to indicate the respective contributions made to passenger and freight services by B.R.'s labour force. While indicators (15) and (19), i.e. loaded train miles per train crew member, show more refinement by separating train crew members from the other members of staff, these still fail to distinguish between the respective contributions of train crews to passenger and freight services.
These two types of indicators are too crude a measure of labour inputs required for a given level of service. Therefore, their use as yardsticks by a regulatory authority is likely to result in the employment of arbitrary standards. However, some refinement of these indicators is not only necessary, but it is also possible. Indeed, there is considerable evidence that labour inefficiencies do exist at B.R., but which indicators (15), (16), (19) and (20) do not reveal. A closer examination of the working practices of B.R.'s labour force would provide the necessary information. 7

Therefore, the regulation of B.R. might be tightened by linking it to the elimination of identified inefficiencies in working practices. However, this approach to the regulation of B.R. (or the R.R.O.C.) involves the regulatory authority in the detailed arrangements for the management of labour. The issues raised by this are taken up below, after the discussion of B.R.'s existing performance indicators on the use of capital inputs.

As regards capital inputs, the non-financial indicators in table 6.1 (of relevance to the R.R.O.C.) highlight the load factor for passenger services (12) and for freight services (17) and (18). All of these factors are of crucial importance in determining the efficiency of the railways. Thus, the higher the load factors the more likely that R.R.O.C. will be using resources efficiently

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7 This issue is examined, in detail, in chapter 8 below.
and spreading its costs over higher outputs. However, the improved regulation of the railways cannot be achieved by simply linking its financial objective to specified levels of load factors in a fashion which eliminates productive inefficiencies. The major difficulty in such an exercise is the specification of 'acceptable levels' of efficiency of capital inputs, as expressed by non-financial indicators (12), (17) and (18).

There are a number of ways in which such 'acceptable levels' of efficiency might be determined: (a) railway management might specify its view on attainable levels for indicators (12), (17), (18); (b) reference might be made to the load factors of other railways and (c) B.R.'s existing indicators might be supplemented with additional information on railway operations. However, none of these is without its defects.

Alternative (a) is too reliant on railway management to be of use to a regulatory authority. It allows management to devise its own yardstick of success or failure. The evident lack of objectivity in such an arrangement undermines its usefulness. Indeed, strictly speaking, this approach is geared to assessing the 'effectiveness' (i.e. degree of attainment of a specified goal) rather than the efficiency (i.e. minimal use of inputs for a given level of output) of the railways. As such, the goal of eliminating productive inefficiencies need not form part of management's definition of 'acceptability'. Thus, the scope for inbuilt inefficiencies or 'organisational slack' could influence management's view of 'attainability', as expressed by these indicators.
Alternative (b), reference to other railways, is similar to
the proposed solution for the assessment of the efficiency of labour.
However, the efficiency of asset utilisation is less amenable to this
approach. Indeed, the difficulties of international railway
comparisons of this nature are well known. The major difficulty
arises in determining comparability between nations. Thus, the
principal reasons for difficulties in making such international
comparisons are geographical (reflecting the different patterns of
concentration of population and production: the maximum length of
haul of freight, as limited by the country's size; the differences
between through transits (of freight and passengers) between countries
on continental rail networks as opposed to an isolated island network
in the U.K.); historical (as evidenced in the different development
of inland transport systems, for example, a greater reliance on inland
waterways in certain European countries); and managerial/institutional
(as demonstrated by the differences in the quality and types of
rolling stock and permanent way used by management, as constrained by
the availability of funds at the institutional level). As a result,
there is no readily identifiable railway which might serve as a specific
reference point in the regulation of the R.R.O.C. Nevertheless, it
would be possible, for example, to set R.R.O.C.'s load factors within
the context of upper and lower limits of attainability derived from
other railways. However, there is an admitted lack of precision in
such an approach.

8 See, for example, M.E. Paul's (1962) account of the differences
between international railway systems.
The final alternative, (c) above, was to probe behind management's notions of attainable levels of load factors and route utilisation. In this respect, there is potential for a greater detail to be brought to bear upon such assessments. Some examples of the additional information which might be used are as follows.

For example, information on the density of rail operations (both passenger and freight) in terms of time (peak v. off peak, seasonal fluctuations) and geographical location (for example, branch lines, inter-city routes). If these details of the flow of traffic were combined with the type of rolling stock (for example, diesel, electric, multiple units) used for different traffics and the rate at which it moves, a more accurate picture would be obtained of the efficiency with which capital inputs are utilised. In addition, specifically as regards freight, the speed with which it is loaded, unloaded and the wagons 'turned round' will also be a factor which affects its efficiency. Also, in part, the load factor obtained will be influenced by the quality and condition of B.R.'s rolling stock and the state of repair of the permanent way. In the event of inefficiencies being pinpointed by such information, this might lead to their elimination. For example, by rescheduling of services or of types of rolling stock.

In seeking such information and setting standards of attainment based upon it, the regulatory authority is being drawn into the details of operational management. (This is also true of the type of information required to assess labour efficiency, as noted above.) This represents a change of emphasis from existing relationships. At
present B.R., as a public corporation, is autonomous, although it must take account of the views of Government. Thus, the status quo is that Government should not become involved in day-to-day management, but should be concerned with management at the policy-making level. However, under alternative (c), the degree of detail and direction entailed in the decisions on how best to use labour and capital inputs is such that there is a virtual subrogation of management's function by the regulatory authority. The desirability or otherwise of such a change is discussed further below, in the context of parts (2), 'Quality of Service' Measures, and (3), Volume of Service Constraints, of this chapter.

2. QUALITY OF SERVICE INDICATORS

This part of this chapter discusses the possibility of regulating railways by using non-financial indicators of 'quality of service'. The actual indicators of quality of service discussed here are those advocated by Baumol (1975) for Amtrak, in the U.S. These indicators are specifically aimed at the quality of service of subsidised passenger operations provided by U.S. railroads on behalf of Amtrak. Under this arrangement, standards are set for specific aspects of 'quality of service' and payment of subsidies is dependent upon their attainment.

In this scheme, 'quality of service' has two components, passenger comfort and the timeliness of services provided. The
factors comprising each of these aspects are set out in table 6.2.\(^9\) Those which are used for passenger comfort are self-explanatory. This is also true of the definition of 'timeliness', with the exception of two factors: (2) 1(b), 'marginal incentive bonuses' and (2) 2, the 'excess delay tolerance parameter'. The first of those refers to 'bonus' subsidy payments of fixed amounts for every percentage point by which a given railroad exceeds its 'base standard' of timeliness. This base standard is a specified percentage of trains which arrive on time. The second, the 'excess delay parameter', refers to an allowance for delays in journey times. Specifically, a train is defined to have arrived at its final destination on schedule if it has fallen behind by no more than five minutes for every hundred miles it has travelled, with a maximum tolerance of 30 minutes, no matter what distance it has covered (Baumol, op.cit., p.289).

As for the applicability of this scheme to R.R.O.C., a number of criticisms might be expressed regarding, (i) its narrowness, (ii) the appropriateness of the indicators included and (iii) its rationale.

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\(^9\) One specific 'quality of service' item which has been excluded is that of 'recovered time'. This refers to the time made up by one railroad company on a train delivered late by another railroad. This factor is unique to the U.S. and is not discussed here in the context of B.R.
Table 6.2 Non-financial Indicators of Quality of Service

(1) Passenger Comfort:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Basis of Subsidy Payment or Deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Carriage Cleanliness</td>
<td>The cost of cleaning a carriage.</td>
</tr>
<tr>
<td>2. Equipment Operability</td>
<td>Required attributes:</td>
</tr>
<tr>
<td></td>
<td>(i) One carriage for a complete journey, without breakdown.</td>
</tr>
<tr>
<td></td>
<td>(ii) Temperature, ( t ), must be within the range, ( 62^\circ &lt; t &lt; 82^\circ ).</td>
</tr>
<tr>
<td></td>
<td>(iii) Sufficient light for reading.</td>
</tr>
</tbody>
</table>

(2) Timeliness of Services Provided:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Basis of Subsidy Payment or Deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Schedule Adherence</td>
<td>(a) Base standard for timeliness.</td>
</tr>
<tr>
<td></td>
<td>(b) Marginal incentive 'bonuses'.</td>
</tr>
<tr>
<td>2. Excessive Delay</td>
<td>(Actual time of trip - scheduled time - 'excess delay' tolerance parameter)</td>
</tr>
<tr>
<td>3. Schedule Improvement</td>
<td>( T \times \frac{M}{\text{Sch.T}} \times R )</td>
</tr>
<tr>
<td></td>
<td>where:</td>
</tr>
<tr>
<td></td>
<td>( T ) = no. of trips for train whose schedule is improved.</td>
</tr>
<tr>
<td></td>
<td>( M ) = no. of minutes eliminated from schedule.</td>
</tr>
<tr>
<td></td>
<td>( \text{Sch.T} ) = scheduled trip time in minutes.</td>
</tr>
<tr>
<td></td>
<td>( R ) = rate for the train (as specified for given routes).</td>
</tr>
<tr>
<td>4. Equipment Availability</td>
<td>A target for the number of spare locomotives and carriages required to maintain scheduled services.</td>
</tr>
</tbody>
</table>

Compiled from W.J. Baumol, op.cit., (1975).
(i) **Narrowness of the amtrak scheme**

The scheme of regulation shown in table 6.2 might appear to be excessively narrow, both as regards its concentration on passenger services and on quality of service. However, assuming, pro tempore, that these indicators are of use, they might be extended to freight services by simply excluding consideration of passenger comfort and concentrating on timeliness of services provided. Also, the apparent emphasis on quality of service (to the potential neglect of the economy of the services provided) is somewhat misleading. Indeed, indicators of efficiency do form part of the overall scheme of regulation.

However, the measurement of efficiency in this scheme is confined to the conventional partial indicator of labour usage. This is utilised in two ways: (a) on certain lines the numbers of workers allowed are specified "... category, by category, train by train, and service by service .... with payments based on wage rates determined in union negotiations" (Baumol, op.cit., p.290) and (b) in other cases a fixed payment is specified for particular services. This type of indicator does not provide an adequate indication of whether there is a wasteful use of resources because it ignores the usage of capital assets. Also, it does not preclude the possibility of organisational slack in the setting of standards for labour allowed. This latter criticism can also be made of method (b) above, in which 'economy' of operation cannot realistically be expected to be achieved by establishing arbitrary limits on expenditure. Indeed, an investigation subsequent to the adoption of this incentive scheme has
suggested that such slack might exist, both in terms of the numbers of staff required per train and the level of payment (G.A.O., 1978). Nevertheless, these economy measures stipulated as part of the Amtrak scheme of regulation might be supplemented by the type of information required to assess the operational efficiency of B.R., as suggested above, in the discussion of B.R.'s existing performance indicators. Therefore, the criticism that this scheme is not sufficiently comprehensive need not be valid.

(ii) Appropriateness of the indicators

While possible criticisms of Amtrak's scheme being excessively narrow are unfounded, this is not the case with the usefulness of its 'quality of service' indicators. There are two criticisms which might be made against these indicators. In the first place, the same reservations which apply to the efficiency measure are relevant here. Specifically, the setting of standards always carries the potential cost of built-in organisational slack. In the context of the indicators in table 6.2, therefore, this criticism is relevant to (2) 1 (a), establishing a base standard for timeliness; (2) 2, the 'excess delay' tolerance parameter; (2) 3, scheduled trip times and \( R \), the rate for the train; and (2) 4, the level of plant required to meet peaks in demand.

Indeed, there is evidence that U.S. railroads regulated by this scheme have built-in organisational slack. Thus, an investigation (G.A.O., 1977) revealed that no railroads responded to the 'schedule improvement' incentive and that incentives were predominantly paid for schedule adherence. This report found that railroads modified
schedules to make them easier to observe. Thus as punctuality was only measured in terms of final destination, railroads inserted 'slack' in the schedules approaching that destination, such that trains could arrive 'on time'. Indeed, Amtrak's average speed fell from 51.5 miles per hour in 1971 to just over 45 miles per hour in 1977. This is just one aspect of the possibility for such slack.

Another, potentially more important, matter than this, however, is the extent to which such indicators can meaningfully be used as a basis of subsidy payment. This is particularly because of the extent to which subsidy payment is contingent upon factors beyond the control of railway management. This varies from the frequency with which trains are cleaned, which is controllable, to the effects of adverse weather conditions, which are obviously uncontrollable. A further aspect of this issue of the degree of influence which management can exist is the state of equipment used. This could significantly influence both the degree of passenger comfort and the timeliness of services provided. This can be seen from the perspective of B.R., which has not only produced a similar set of non-financial criteria of 'quality of service',¹⁰ as that detailed in table 6.2, but

¹⁰ The quality of service criteria referred to are those which a management consultancy team reported to B.R. as being of most importance to rail travellers. This survey of commuters produced the following six requirements: (1) a punctual and reliable service as timetabled; (2) clean, bright and cheerful trains; (3) reasonably comfortable seats for all passengers except on short journeys of 10 to 15 minutes; (4) information and advice in case of disruption; (5) adequate staffing and environment at stations and (6) free movement between coaches to increase personal security, reduce vandalism and improve ticket control (B.R., Towards a Commuters' Charter, 1979). The additional funds sought to satisfy such criteria comprised the following: £300 million for 2,000 new coaches; £200 million for track renewals; £190 million for signalling and track layout; £160 million for electrification of railway lines and £40 million for the improvement of stations.
has also requested an additional £890 million (1979 costs) to enable it to achieve such standards in its London and South Eastern services (B.R., 1979). Therefore, the size of subsidy might depend upon the 'quality of service', but the 'quality of service' depends upon the size of the subsidy. Indeed, this type of interdependence is highly likely to arise where the subsidy received for such services is a major source of their finance.

(iii) The rationale of Amtrak's 'quality of service' indicators

Not only can doubts be expressed about the usefulness of the 'quality of service' indicators in this scheme of regulation, but there are also doubts concerning its underlying rationale. The major issue here is the nature of market to be served. In the case presented for the Amtrak Scheme, Baumol (op.cit., p.282) makes explicit reference to the potential usefulness of quality of service indicators in the context of a regulated monopoly. If this is a profitable monopolist, the case for preventing it from exploiting its monopoly power by reducing the quality of its service is evident. However, the case for their introduction in the situation of subsidised state monopolies, such as Amtrak, is complicated by the existence of competitive pressures.

Indeed, in the case of B.R. (as would be the case with state-owned R.R.O.C.), it has been suggested that, despite the fact that it is designated a 'state monopoly', it does face competition. It is shown below that a similar circumstance holds for Amtrak. However,
the nature of such competition is crucial in determining the importance to be attached to 'quality of service' indicators. Thus, the emphasis placed on 'quality of service' at Amtrak reflects a belief that there is a need to redress the imbalance in U.S. railway services caused by railroads concentrating on the more profitable freight services, at the expense of the quality of passenger services (Baumol, op.cit., p.282). However, the basic argument that, therefore, Amtrak should have stressed 'quality of service' to regain passengers implies that is operates in a monopolistic market. Under these circumstances competing firms vie for custom by seeking to differentiate their product or service from their competitors. In this way, concentration on quality of service might offer a means of Amtrak winning back customers from its competitors.

However, there is evidence that this viewpoint represents a misinterpretation of the nature of Amtrak's market and that price competition is of greater importance. In the first instance, there is such evidence in a report commissioned by, and presented to, Amtrak during its first year of operation. Secondly, an examination of Amtrak's experiences since its creation vindicate this as an erroneous understanding of the nature of its market.

As regards the first piece of evidence, the questions contained in a survey of existing and potential inter-city travellers by train, plane, car or bus were predominantly concerned with the detection of attitudes towards 'quality of service' (Harris, 1972). However, this report revealed that the 'quality of service' considerations which ranked highly with travellers were generally those which are inherent
in public rail transport. Thus, the major advantages of rail travel were considered to be (a) the ability to look at scenery (41 percent of sample); (b) the ability to walk around - not confined to one's seat (26 percent of sample); (c) there is no need to drive, it is possible to relax and sleep (24 percent of sample). On the question of disadvantages, 39 percent of the sample thought trains were too slow, but there were no other such disadvantages on which a significant proportion of the sample concurred. Of the attributes identified as being of major importance, therefore, only 'timeliness' is one which a railway could improve upon to attract passengers.

However, the significance of timeliness of railway operations has to be placed into context. In particular, the relative importance of this factor has to be assessed in relation to sensitivity to prices. There are three pieces of information within this study which suggest that the price of travel is considerable, perhaps of the utmost, importance to Amtrak's travellers. First of all, within the 'advantages' of rail travel, only 18 percent of the sample considered it to be inexpensive - an indication of high prices relative to other modes. Secondly, in response to a question on whether travellers would go by train if it cost 20 percent less than air, bus or car, 49 percent of the sample said they would travel by train. This contrasted with 37 percent of the sample who would have preferred the train option on the basis of the costs of the competing modes at the time of questioning. Furthermore, in addition to this indication of price elasticity of demand, 63 percent of the sample rated
the cost of the trip as the dominant consideration, in a question on the most important factors in choosing how to travel.

Indeed, these pointers to price competition are supported by Amtrak's own subsequent experiences. Thus, it has calculated an elasticity of demand for single fares (based on all its markets and all the regions it services) of -2.2 (Hilton, 1980, p.37). A breakdown of this figure, geographically and by type of journey, also reveals high price elasticities, which reflects the abundance of alternative modes in all its markets. Amtrak has also found relatively high cross-elasticities of demand with other modes, measured as the percentage change in passengers carried by either mode, after a one percent change in fare of the other (Hilton, op.cit., p.37). These findings are consistent with the experiences of B.R., as noted above.

All of this points to markets in which price competition is of great significance and, consequently, the potential importance of quality of service indicators is diminished. Indeed, to the extent that such price competition exists, it might be presumed that existing regular passengers are satisfied (as revealed by their willingness-to-pay) with the quality of service, without recourse to its detailed measurement and regulation in the manner prescribed for Amtrak. It is instructive to note, for example, that in the Harris (op.cit.) survey, 71 percent of the regular train travellers were satisfied with the price they paid; 68 percent were satisfied with their personal comfort; and 89 percent were satisfied with their safety. In general, these travellers were satisfied with both price paid and
quality of service, with minor exceptions (for example, 32 percent considered that they were not offered "good food at a reasonable price", Harris, op.cit., p.31).

Prima facie, these findings appear to be inconsistent with those of B.R., in the abovementioned survey of commuters in the S.E. England. In that study, existing commuters expressed dissatisfaction with the quality of B.R.'s services. This suggests that 'willingness-to-pay' cannot be used as a measure of consumers' satisfaction with the quality of railway services. However, as noted earlier, this regional market is one in which B.R. has been described as having monopoly powers (Monopolies Commission, op.cit.). This is quite different from the (price) competitive nature of most B.R. (and Amtrak) markets, in which willingness-to-pay might be accepted as a measure of consumer satisfaction. Indeed, it is quite possible that the poor quality of service reported upon in B.R.'s survey might be a reflection of it exploiting its monopoly powers. For example, it might have used its most modern equipment (such as high speed trains) on competitive inter-city routes, at the expense of the quality of service of its captive market in the S.E. commuter services. Therefore, B.R.'s survey is not necessarily inconsistent with the Harris study.

Overall, therefore, the usefulness of the Amtrak 'quality of service' indicators might be summarised as follows. On the one hand, these indicators might be of some use in the regulation of a profitable monopoly (national, regional or local; state-owned or private). Caveats to their use in this manner are (a) the potential for built-in
organisational slack and (b) the detailed information required to regulate 'quality of service' is similar to that required to effectively assess productive efficiency, with consequent severe loss of autonomy of the regulated firm.

On the other hand, in the situation of subsidised state monopolies in which there are elements of considerable monopoly power (for example B.R.'s South-Eastern Region commuter services), there is a possible distortion of the very rationale of introducing subsidisation, contingent upon 'quality of service'. In this situation, there is a potential for the operator to divert resources away from markets in which he has monopoly power (thereby undermining the quality of its service) and, in effect, to cross-subsidise services in competitive markets. Furthermore, in competitive markets in which price competition is the dominant consideration (such as those typically faced by B.R. and Amtrak), the use of such indicators is highly questionable. It might be argued that 'quality of service' indicators might serve as a device by which customers might be won back to the railways. However, as noted above, this is based on the dubious assumption that 'quality of service' is of more importance than price competition to Amtrak and B.R. (and, therefore, to R.R.O.C.).

3. VOLUME OF SERVICE CONSTRAINTS

This means of regulating the railways reflects the advocacy of a different philosophy of management from that discussed in previous sections. Instead of providing a detailed specification of what
constitutes an adequate service, this approach introduces a broad framework within which management can operate. When a financial target is combined with a volume of service constraint, it imposes financial discipline, but simultaneously leaves discretion on how to manage railway services to the operator, within specified constraints. As such, it is compatible with the concept of the public corporation prevalent in the U.K., which attempts to reconcile autonomy of management with public service obligations. Indeed, it has actually been employed by one such corporation, London Transport, since 1975. Versions of this type of objective have also been proposed for B.R. (Parker, 1978; Edgely, 1980).

This approach has typically been advocated in the context of subsidised passenger transport services (e.g. Nash, 1978). Its aim is to overcome the defects associated with the open-ended subsidising of such services. Namely, the proliferation of expenditure without regard to financial constraints and the adequacy of services provided. However, although this approach is aimed at unprofitable passenger services, it is appropriate to other kinds of transport services. For example, it could be extended to freight services by the use of net ton miles as a volume of service constraint. Also, it could be utilised in the regulation of a monopolist supplier of transport services who has no need of subsidy. By imposing a target on the volume of service to be provided, this prevents a monopolist from restricting output and increasing prices in the pursuit of profit.

However, a potential difficulty with this approach is the heterogeneous nature of railway services, particularly its passenger
market. Therefore, the maximisation of passenger miles, subject only to a financial constraint would make it in management's best interests to increase the number of passenger miles by cross-subsidisation. That is, by reducing prices in competitive markets, they might expect to gain additional passenger miles. If this resulted in lower total revenues from such services, it might be possible for the railways to recover such reductions in gross revenue by increasing prices on services which have an inelastic demand, for which it could be expected that passenger miles would remain the same. The obvious way of rectifying this is the introduction of weights - a suggestion made by Glaister and Collings (1978). This has been accepted by B.R. (Edgely, 1980). It would be implemented by the Minister of Transport assigning weights to the different services which the Government is prepared to subsidise.

This might also be applied to a profitable monopoly. In this situation, a minimum volume of service would be specified by the regulatory authority. In this way, it could prevent a monopoly from exploiting its power to restrict output, increase prices and, thereby, to maximise profits. If the profitable monopolist offered heterogeneous services, these could be weighted by the Minister or regulatory authority according to the degree of monopoly power which it sought to curb, in a manner analogous to the weighting of subsidised state railway operations.

The use of volume of service constraints in this way might be represented as a non-linear programme, as set out in table 6.3
Formulation (1), table 6.3 depicts a scheme of regulation in which the non-financial indicator, passenger miles, is maximised, subject to a financial constraint. In this formulation, $g_i$ are weights, with which the Minister indicates the amount by which he is prepared to subsidise different services. Under this arrangement, the contribution margin, $\pi$, required from railway operations might be positive or negative, dependent on the size of the subsidy payable.

It was also noted above that this means of regulating a subsidised state monopoly might be used for a regulated, profitable monopoly. This latter situation might also be represented as a non-linear programme, as set out in table 6.3 (2) (after Glaister and Collings, op.cit.). In this model, the constraint $M$, specifies a minimum level of passenger miles to be provided.\(^\text{11}\) This formulation has a clear correspondence to the previous one. Mathematically, this latter formulation can be seen as the dual of the first one. Thus, if the lower limit on passenger miles, $M$, in formulation (2) is set at the maximum value of the passenger miles in the passenger-miles maximising problem, and if the contribution margin constraint, $\pi$, in formulation (1) is set at the maximum value of the constrained profit maximising formulation, identical solutions to (1) and (2) will result (Glaister and Collings).\(^\text{12}\)

\(^{11}\) Similarly, if it was considered desirable to regulate a monopolist freight carrier, net ton miles could easily replace the passenger miles figure.

\(^{12}\) This also assumes that the same weights, $g_i$, would be attached to the various segments of the volume of services to be attained in both versions of the model.
Table 6.3  Volume of Service Constraint: Alternative Formulations 

(1) Maximisation of Passenger Miles, Subject to a Budget Constraint.

Max. \( \sum f_i(g_i) \)

s.t. \( \sum [p_i f_i(g_i) - C_i(f_i(g_i))] \geq \pi \)

\[ 0 \leq g_i \leq \alpha_i \quad i = 1, 2 \ldots n \]

where: \( f_i = \) no. of passenger miles per annum
\( g_i = \) pence per passenger mile at fare level, \( g \)
\( p_i = \) money fare
\( \alpha_i = \) an upper limit on fares
\( C_i = \) operating costs
\( \pi = \) contribution to fixed costs

(2) Maximisation of Profit, Subject to a Passenger Miles Constraint.

Max. \( \sum [p_i f_i(g_i) - C_i(f_i(g_i))] \)

s.t. \( \sum f_i(g_i) \geq M \)

\[ 0 \leq g_i \leq \alpha_i \quad i = 1, 2 \ldots n \]

where: \( f_i, g_i, p_i, \alpha_i, C_i \) as before.
\( M = \) minimum passenger miles.
4. **CONCLUSION**

This chapter examined the potential for the revision of financial objectives by the introduction of non-financial indicators. Three possible schemes of regulation of the reconstructed railway operating company (R.R.O.C) were considered: (a) productive efficiency indicators; (b) quality of service measures; (c) volume of service constraints.

Two possible interpretations of productive efficiency were considered: X-efficiency and a more pragmatic version of productive efficiency as currently recommended by Government policy. A major reservation over the use of productive efficiency indicators is its emphasis on the supply of services. This approach assumed that the regulated firm was a monopolist. However, B.R., in its existing form, faces competitive pressures in most of its markets. This circumstance would also apply to R.R.O.C. There are further limitations to the usefulness of such indicators. First of all, it was shown that the first version (X-efficiency) is an elusive concept to define in operational terms. Secondly, there was considerable potential for built-in organisational slack to undermine their usefulness. Thirdly, those non-financial indicators reported by B.R., in compliance with Government policy, simply gave a broad summary of B.R.'s profit and loss account. They lacked the necessary detail to permit a tightening of its financial regulation (and thereby of the R.R.O.C.). However in probing for the necessary operational details of railway operation to ensure productive efficiency was being attained, the existing
Governmental: nationalised industry relationships would be significantly altered. Indeed, it was suggested that the volume and depth of information required in the assessment of productive efficiency might lead to the regulatory authority becoming a form of 'shadow management'. Clearly, such an arrangement would be even less acceptable in the case of a privately-owned R.R.O.C.

The second of these options, 'quality of service' measures, has been used in the regulation of subsidy payments to Amtrak, in the U.S. In one sense, this approach can be seen as being complementary to productive efficiency indicators. Thus, on the one hand, productive efficiency emphasised the inputs to railway services, whereas, on the other hand, this approach emphasises the outputs of railway services. It is not surprising, therefore, that this scheme of regulation is also affected by the abovementioned defects of the productive efficiency option. Thus, the rationale for such an approach is more consistent with a profitable, privately-owned monopolist than with a state-owned R.R.O.C., which faces severe competition. Indeed, the 'quality of service' approach to subsidy management was undertaken in the belief that Amtrak operates in a monopolistic market, in which 'quality of service' is of paramount importance. However, available evidence suggests that price competition is of greater importance in it (and B.R.'s) markets. Also, there is potential for built-in organisational slack, in setting standards of 'quality of service', just as there was with productive efficiency indicators. Furthermore certain of these 'quality of service'
indicators were beyond the control of management and therefore had little to offer as devices by which its efficiency might be assessed.

Finally, the third option, 'volume of service constraints', was found to be the simplest of all to implement. In the case of a subsidised railway services, (i.e. the context in which it was first proposed), it entails the specification of a level of service which the Minister of State is willing to subsidise. In the case of heterogeneous passenger services (such as B.R.'s), a weighting system was suggested. This would prevent management distorting the volume of services attained by adjusting prices in different markets, such that there was cross-subsidisation of profitable services by those which received subsidies. This model, while specified for subsidised railway passenger services, is capable of extension to railway freight services, other modes, or, indeed, to profitable monopolists. Thus, just as the imposition of a specific volume of services prevents the profitable monopolist from restricting output to achieve higher profits, it also prevents the unregulated, subsidised state monopoly from expanding output and incurring greater deficits.

In conclusion, it has been shown that the advocacy of non-financial indicators has primarily been made in two contexts (a) a subsidised state railway or (b) a profitable, private monopoly. Neither circumstance should hold true for the R.R.O.C., with the exception of certain market segments. Therefore, overall, it is suggested here that, if non-financial indicators are to be introduced in the regulation of the R.R.O.C. at all, they would be restricted to certain
segments of its operations, i.e. those with monopoly power. Also, its use would be further restricted to that of a supplement to its financial aims. Furthermore, if such indicators are utilised it is suggested that the third option, the 'volume of service constraint' is most appropriate whether the R.R.O.C. is state-owned or private. This is because it largely preserves managerial autonomy, unlike the other options discussed, which require such detailed information to be effective that the regulatory authority, de facto, assumes a managerial role.