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

by

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Two Volumes

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Chapter 7
A QUALITATIVE ASSESSMENT: (A) MARKET PRESSURES

Perhaps the most fundamental reason for any organisation (state-owned or not) having risk capital is that of a variability of returns which is induced by the normal operating characteristics of its product or service markets. It has already been suggested, in Part II above, that transport operating services exhibit the characteristics of a competitive market and that it might be expected that they are therefore exposed to market pressures (setting aside the problem of Government intervention). In that section of this thesis the emphasis was on the demonstration of the potential for intra-model competition by analysing the circumstances of each transport mode. In this chapter, the existence of inter-model competition, and its impact on railway operations, is explored. A longitudinal, qualitative, assessment is made of the extent to which B.R., in its present form, has been exposed to this element of business risk. It might be considered that B.R., as presently constituted, is insulated from the normal risks of commercial operation, as it is a statutory monopoly. However, as shown below, even in this form, there is evidence of it experiencing market pressures.

A scrutiny of B.R.'s annual reports covering the period 1963-80 revealed two basic types of market pressures: 1, the nature of the
markets served by B.R. and 2, the state of the economy. These are discussed, in turn, below.

1. THE NATURE OF MARKETS SERVED

The means by which the nature of B.R.'s markets affected its reported financial results are examined in two stages. First, the details of the form in which this was perceived to be a business risk are set out. Secondly, the importance of these aspects of risk are evaluated. The analysis of B.R.'s reports uncovered the following two aspects of this risk factor:

(i) Competition in passenger transport

(ii) Competition in freight transport

Regarding the first category, passenger transport, B.R. has consistently maintained that it operates in a fiercely competitive market (1969, 1970, 1976 and 1980). The principal reason offered for the erosion of any monopoly position it might have had is, as might be expected, the development of competing modes. Thus, B.R.

---


has pinpointed the strength of competition it has experienced from air transport, public road transport and, in particular, the widespread ownership of private cars (1963, 1964, 1965, 1968, 1972). Further evidence of the competitive nature of this market is evident from B.R.'s ability to respond to this competition, for example, it has stressed the effectiveness of its inter-city services as a competitor to air and road transport (1966, 1967, 1968, 1969). Also, the abandonment of its traditional policy of charging by mileage (in September, 1968) has led to an ability to respond to competition by varying prices according to perceived market conditions. The consequent flexibility of its pricing policies, allied to special promotions, has attracted additional passengers and increased revenues in these market segments (1970, 1975, 1976, 1977, 1978). However, there is also evidence of price increases deemed to be necessary which reduced passengers carried (1975, 1976). Overall, therefore, B.R. clearly perceives itself to be operating in a competitive market.

As for freight transport, the circumstances of this market are seen to be somewhat different from those of the passenger market, although it is, nonetheless, perceived as being competitive, too. Thus, B.R. has typified all its services as being exposed to competitive pressures (1969, 1972). However, there have been particular developments within the freight market which distinguish it from the competitive pressures of passenger transport. Thus, the abolition of the licensing of carriers (thereby widening the competition for freight) coincided with an observation by B.R. that
it could not operate profitably as a general freight carrier (1970). This observation is further reinforced by a later comment in which B.R. classes the long-distance movement of bulk and wagon-load freight as the natural areas of competition between road and rail (1972). However, in conjunction with this observation about the competitive nature of this market segment, B.R. has also consistently commented on its heavy dependence on such traffic for its freight business, particularly the carriage of coal and steel (1963, 1967, 1970, 1971, 1974, 1976, 1977, 1979). Given this reliance on specialised freight and the competitive market in them, the intensity of the market pressures on its freight business is self-evident. The validity of these claims regarding the competitiveness of its services are examined below.

(i) Competition in passenger transport

In the first instance, an examination of statistics which illustrate the nature of these markets corroborates B.R.'s viewpoint. Thus, as regards passenger transport, there is evidence of increased mobility within the population, but the pattern of this market has changed considerably since the early days of railway nationalisation (see table 7.1). One caveat in the interpretation of this data is that they obviously cannot be regarded as presenting a picture of a total market in which all modes compete for the potential traveller (i.e. demand cross elasticities might range from low to high). This is particularly pertinent to short distance travel in which the rail
Table 7.1  Inland Passenger Transport: Market Shares by Mode, 1954-79*

<table>
<thead>
<tr>
<th>Year</th>
<th>Road Buses and Coaches (%)</th>
<th>Private Transport (%)</th>
<th>Rail (%)</th>
<th>Air (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>81 (41.3)</td>
<td>76 (38.7)</td>
<td>39 (19.9)</td>
<td>0.3 (1)</td>
</tr>
<tr>
<td>1963</td>
<td>67 (23.1)</td>
<td>186 (64.1)</td>
<td>36 (12.4)</td>
<td>1.3 (4)</td>
</tr>
<tr>
<td>1964</td>
<td>65 (20.6)</td>
<td>212 (67.2)</td>
<td>37 (11.7)</td>
<td>1.5 (5)</td>
</tr>
<tr>
<td>1965</td>
<td>63 (19.1)</td>
<td>231 (69.9)</td>
<td>35 (10.6)</td>
<td>1.7 (4)</td>
</tr>
<tr>
<td>1966</td>
<td>62 (17.5)</td>
<td>255 (72.1)</td>
<td>35 (9.9)</td>
<td>1.8 (5)</td>
</tr>
<tr>
<td>1967</td>
<td>61 (16.6)</td>
<td>271 (73.7)</td>
<td>34 (9.2)</td>
<td>1.9 (5)</td>
</tr>
<tr>
<td>1968</td>
<td>59 (15.5)</td>
<td>286 (75.1)</td>
<td>34 (8.9)</td>
<td>1.9 (5)</td>
</tr>
<tr>
<td>1969</td>
<td>58 (15.0)</td>
<td>292 (75.5)</td>
<td>35 (9.1)</td>
<td>1.9 (4)</td>
</tr>
<tr>
<td>1970</td>
<td>56 (13.9)</td>
<td>309 (76.7)</td>
<td>36 (8.9)</td>
<td>2.0 (5)</td>
</tr>
<tr>
<td>1971</td>
<td>56 (13.2)</td>
<td>330 (77.8)</td>
<td>36 (8.5)</td>
<td>2.0 (5)</td>
</tr>
<tr>
<td>1972</td>
<td>55 (12.5)</td>
<td>347 (79.0)</td>
<td>35 (8.0)</td>
<td>2.2 (5)</td>
</tr>
<tr>
<td>1973</td>
<td>54 (11.9)</td>
<td>364 (79.9)</td>
<td>35 (7.7)</td>
<td>2.4 (5)</td>
</tr>
<tr>
<td>1974</td>
<td>54 (12.2)</td>
<td>350 (79.1)</td>
<td>36 (8.1)</td>
<td>2.3 (6)</td>
</tr>
<tr>
<td>1975</td>
<td>54 (12.2)</td>
<td>352 (79.4)</td>
<td>35 (7.9)</td>
<td>2.2 (5)</td>
</tr>
<tr>
<td>1976</td>
<td>53 (11.7)</td>
<td>363 (80.4)</td>
<td>33 (7.3)</td>
<td>2.3 (6)</td>
</tr>
<tr>
<td>1977</td>
<td>53 (11.4)</td>
<td>374 (80.8)</td>
<td>34 (7.3)</td>
<td>2.1 (5)</td>
</tr>
<tr>
<td>1978</td>
<td>52 (10.9)</td>
<td>390 (81.4)</td>
<td>35 (7.3)</td>
<td>2.4 (4)</td>
</tr>
<tr>
<td>1979</td>
<td>52 (10.8)</td>
<td>392 (81.2)</td>
<td>36 (7.5)</td>
<td>2.8 (5)</td>
</tr>
</tbody>
</table>

*expressed as thousand million passenger kilometres.

Source: compiled from Transport Statistics Great Britain, 1969-79 (H.M.S.O.)
and air options are most unlikely to exist. It is nevertheless possible to highlight significant developments in the passenger market from this data. Thus, it is evident that the growth of private road transport has radically altered the market shares held by the various modes. Also, within road transport, the decline in the use of bus and coach relative to private transport suggests that the former is an inferior good. Nevertheless, both frequently represent alternatives to rail travel. Also, the remaining non-rail mode, air travel, is primarily a competitor of the railways alone. Furthermore, as table 7.1 shows, while the relative importance of inland air passenger transport has remained static, the volume of this travel nevertheless exhibits a significant increase.

As for the railways, the decline in their share of the passenger market from 19.9 percent in 1954 to 7.5 percent in 1979 obscures the fact that, in terms of absolute volume of activity, it has experienced only a very limited reduction in its traffic in this period (i.e. from 39 to 36 thousand million passenger kilometres). This relative decline must also be placed in context. There are three, distinct, segments of the railway passenger market: (a) inter-city, (b) major commuter services and (c) services outside the major conurbations. As table 7.2 shows, the first of these has grown slightly in volume terms. On the same basis the second and third segments are relatively static. However, as regards contributions to passenger revenues, inter-city has only maintained, rather than increased, its proportion despite its increased volume of business. The commuter and local
Table 7.2  B.R.'s Passenger Traffic, 1970-80

<table>
<thead>
<tr>
<th></th>
<th>VOLUME(^1)</th>
<th></th>
<th></th>
<th>REVENUE(^2)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inter-City</td>
<td>London &amp; S.E.</td>
<td>Local Provincial</td>
<td>Inter-City</td>
<td>London &amp; S.E.</td>
<td>Local Provincial</td>
</tr>
<tr>
<td>1970</td>
<td>40.8</td>
<td>44.3</td>
<td>14.9</td>
<td>44.5</td>
<td>42.7</td>
<td>12.8</td>
</tr>
<tr>
<td>1971</td>
<td>41.2</td>
<td>43.9</td>
<td>14.9</td>
<td>44.4</td>
<td>43.3</td>
<td>12.3</td>
</tr>
<tr>
<td>1972</td>
<td>41.6</td>
<td>43.0</td>
<td>15.5</td>
<td>44.2</td>
<td>43.4</td>
<td>12.4</td>
</tr>
<tr>
<td>1973</td>
<td>42.3</td>
<td>42.6</td>
<td>15.1</td>
<td>44.0</td>
<td>44.3</td>
<td>11.7</td>
</tr>
<tr>
<td>1974</td>
<td>42.7</td>
<td>42.7</td>
<td>14.6</td>
<td>45.0</td>
<td>43.5</td>
<td>11.5</td>
</tr>
<tr>
<td>1975</td>
<td>41.6</td>
<td>44.2</td>
<td>14.2</td>
<td>46.2</td>
<td>40.8</td>
<td>13.1</td>
</tr>
<tr>
<td>1976</td>
<td>40.0</td>
<td>45.3</td>
<td>14.7</td>
<td>44.0</td>
<td>42.8</td>
<td>13.2</td>
</tr>
<tr>
<td>1977</td>
<td>42.3</td>
<td>44.0</td>
<td>13.7</td>
<td>44.4</td>
<td>43.2</td>
<td>12.4</td>
</tr>
<tr>
<td>1978</td>
<td>43.5</td>
<td>43.2</td>
<td>13.3</td>
<td>45.0</td>
<td>42.9</td>
<td>12.1</td>
</tr>
<tr>
<td>1979</td>
<td>43.8</td>
<td>42.2</td>
<td>14.0</td>
<td>45.0</td>
<td>42.3</td>
<td>12.7</td>
</tr>
<tr>
<td>1980</td>
<td>43.4</td>
<td>42.7</td>
<td>13.9</td>
<td>45.0</td>
<td>42.3</td>
<td>12.7</td>
</tr>
</tbody>
</table>

\(^1\) expressed as percentages of total thousand million passenger kilometres in any given year.

\(^2\) expressed as percentages of total passenger receipts in any given year.

Source: compiled from Transport Statistics Great Britain, 1970-80 (H.M.S.O.)
services have also maintained their proportions of total passenger revenues, despite minor reductions in the volume of their services. The implications of this pattern of activity for the degree of competition present in these market segments must be examined with some caution, as the data are of an aggregate nature and do not therefore demonstrate price-quantity relationships with precision. However, this information, in conjunction with that regarding road and air transport offers at least presumptive evidence of a competitive market in passenger transport. Thus, while the above-mentioned ability of B.R. to vary its prices according to demand conditions has increased its volume of inter-city business, this has been accompanied by a less than proportionate increase in total revenues (see table 7.2). This suggests that there is some measure of price elasticity in the demand for inter-city rail services. Similarly, the static nature of its other market segments (in both volume and revenue terms), combined with its inability to take a share of the increased passenger travel indicated in table 7.1, suggests that B.R. faces a moderately high cross-elasticity of demand.

(ii) Competition in freight transport

There is also evidence which corroborates B.R.'s view that the freight market is also competitive. Table 7.3 sets out the market shares of inland freight transport. This must be interpreted with some caution as the freight moved by road includes short-haul traffic, for which there is no rail option. Bearing this caveat in mind, it
Table 7.3  Inland Freight Transport: Market Shares by Mode, 1964-79

<table>
<thead>
<tr>
<th>Year</th>
<th>Road (%)</th>
<th>Rail (%)</th>
<th>Other (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>65.7 (70.5)</td>
<td>26.2 (28.1)</td>
<td>1.3 (1.4)</td>
</tr>
<tr>
<td>1965</td>
<td>68.8 (72.0)</td>
<td>25.2 (26.4)</td>
<td>1.5 (1.6)</td>
</tr>
<tr>
<td>1966</td>
<td>73.2 (73.8)</td>
<td>24.2 (24.4)</td>
<td>1.8 (1.8)</td>
</tr>
<tr>
<td>1967</td>
<td>74.6 (75.6)</td>
<td>22.3 (22.6)</td>
<td>1.8 (1.8)</td>
</tr>
<tr>
<td>1968</td>
<td>79.0 (74.8)</td>
<td>24.0 (22.7)</td>
<td>2.6 (2.5)</td>
</tr>
<tr>
<td>1969</td>
<td>83.4 (74.9)</td>
<td>25.3 (22.7)</td>
<td>2.7 (2.4)</td>
</tr>
<tr>
<td>1970</td>
<td>85.0 (74.0)</td>
<td>26.8 (23.3)</td>
<td>3.0 (2.7)</td>
</tr>
<tr>
<td>1971</td>
<td>85.8 (75.6)</td>
<td>24.3 (21.4)</td>
<td>3.4 (3.0)</td>
</tr>
<tr>
<td>1972</td>
<td>87.5 (76.7)</td>
<td>23.4 (20.5)</td>
<td>3.2 (2.8)</td>
</tr>
<tr>
<td>1973</td>
<td>90.4 (75.6)</td>
<td>25.6 (21.4)</td>
<td>3.5 (3.0)</td>
</tr>
<tr>
<td>1974</td>
<td>89.9 (76.6)</td>
<td>22.0 (18.8)</td>
<td>5.4 (4.6)</td>
</tr>
<tr>
<td>1975</td>
<td>95.3 (78.0)</td>
<td>20.9 (17.1)</td>
<td>6.0 (4.9)</td>
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<tr>
<td>1976</td>
<td>95.6 (78.4)</td>
<td>20.6 (16.9)</td>
<td>5.8 (4.7)</td>
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<tr>
<td>1977</td>
<td>98.0 (77.9)</td>
<td>20.1 (15.8)</td>
<td>8.9 (6.3)</td>
</tr>
<tr>
<td>1978</td>
<td>99.1 (76.7)</td>
<td>20.0 (15.5)</td>
<td>10.0 (7.8)</td>
</tr>
<tr>
<td>1979</td>
<td>104.6 (77.5)</td>
<td>20.0 (14.8)</td>
<td>10.4 (7.7)</td>
</tr>
</tbody>
</table>

1 expressed as thousand million tonne-kilometre.
2 comprises inland waterways and pipelines.

Source: compiled from Transport Statistics Great Britain, 1969-79 (H.M.S.O.)
is nevertheless evident that road freight is increasingly the dominant mode of freight transport, with rail having a correspondingly diminishing market share. The third category of inland freight comprises waterways and pipeline. The first of these is negligible. The second exhibits a significant growth in the 1970's in the conveyance of highly specialised traffic, i.e. gas and, predominantly, petroleum. However, the petroleum which is carried by pipeline is crude, the form in which it is normally carried by rail, thereby posing a possible threat to B.R.'s oil freight.

The impact of these competing modes on the mix of B.R.'s freight is indicated in table 7.4. Its principal categories of freight, coal and steel, have reduced, as have the carriage of motor vehicles and components. Other lesser items such as chemicals and building materials have proved to be relatively static. There has, however, been some growth in the freight of oil, earth and stones, which might be seen as complements to the distribution of such materials by road. Overall, however, B.R.'s freight has had a heavy dependence on its traditional traffic of coal and steel during this period. This heavy reliance on a limited number of customers is itself a significant business risk. Thus, as figure 7.1 shows, coal and steel freight have usually provided almost two-thirds of B.R.'s total freight revenues in every year of the period 1963-80. Furthermore, the existence of alternative modes (roads, inland waterways,

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3 See Pryke and Dodgson, op.cit., p.44. Of course, this threat does not exist in the short run, given the need to actually construct a pipeline system to replace rail.
Table 7.4  B.R.'s Freight Traffic, 1964-80

<table>
<thead>
<tr>
<th></th>
<th>Coal</th>
<th>Steel</th>
<th>Chemicals</th>
<th>Earth, Stones</th>
<th>Building Materials</th>
<th>Oil</th>
<th>Motor Vehicles, Components</th>
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<tbody>
<tr>
<td>1964</td>
<td>47.9</td>
<td>20.9</td>
<td>5.4</td>
<td>5.5</td>
<td>4.5</td>
<td>4.7</td>
<td>4.0</td>
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<td>1965</td>
<td>46.6</td>
<td>21.4</td>
<td>5.5</td>
<td>5.2</td>
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<td>1966</td>
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<td>5.0</td>
<td>5.4</td>
<td>4.8</td>
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<td>1968</td>
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<td>6.2</td>
<td>4.2</td>
<td>10.1</td>
<td>3.7</td>
</tr>
<tr>
<td>1969</td>
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<td>4.8</td>
<td>6.6</td>
<td>4.1</td>
<td>11.2</td>
<td>3.4</td>
</tr>
<tr>
<td>1970</td>
<td>41.6</td>
<td>19.1</td>
<td>4.9</td>
<td>8.2</td>
<td>3.5</td>
<td>13.3</td>
<td>4.1</td>
</tr>
<tr>
<td>1971</td>
<td>38.7</td>
<td>17.0</td>
<td>5.2</td>
<td>10.1</td>
<td>4.1</td>
<td>15.0</td>
<td>4.4</td>
</tr>
<tr>
<td>1972</td>
<td>38.7</td>
<td>16.8</td>
<td>5.0</td>
<td>4.4</td>
<td>4.9</td>
<td>16.6</td>
<td>4.4</td>
</tr>
<tr>
<td>1973</td>
<td>39.7</td>
<td>17.2</td>
<td>4.8</td>
<td>10.6</td>
<td>4.9</td>
<td>15.3</td>
<td>3.9</td>
</tr>
<tr>
<td>1974</td>
<td>38.3</td>
<td>16.9</td>
<td>5.2</td>
<td>12.9</td>
<td>4.7</td>
<td>14.8</td>
<td>3.4</td>
</tr>
<tr>
<td>1975</td>
<td>44.4</td>
<td>14.6</td>
<td>5.0</td>
<td>11.1</td>
<td>5.7</td>
<td>12.9</td>
<td>3.0</td>
</tr>
<tr>
<td>1976</td>
<td>43.5</td>
<td>17.5</td>
<td>5.2</td>
<td>9.8</td>
<td>5.1</td>
<td>13.2</td>
<td>3.1</td>
</tr>
<tr>
<td>1977</td>
<td>44.5</td>
<td>15.1</td>
<td>5.3</td>
<td>10.9</td>
<td>4.4</td>
<td>14.2</td>
<td>2.8</td>
</tr>
<tr>
<td>1978</td>
<td>34.2</td>
<td>14.0</td>
<td>5.2</td>
<td>10.6</td>
<td>4.0</td>
<td>13.5</td>
<td>2.8</td>
</tr>
<tr>
<td>1979</td>
<td>34.1</td>
<td>14.7</td>
<td>5.1</td>
<td>10.8</td>
<td>3.7</td>
<td>13.2</td>
<td>2.8</td>
</tr>
<tr>
<td>1980</td>
<td>36.6</td>
<td>9.7</td>
<td>5.1</td>
<td>11.8</td>
<td>3.9</td>
<td>12.8</td>
<td>2.7</td>
</tr>
</tbody>
</table>

1 expressed as percentages of million tonne-kilometres of total freight moved by B.R. in any given year. (No single year sums to 100 as minor freight traffics have been excluded.)

Figure 7.1  Revenues from Coal and Steel as a Proportion of R&R's Total Freight Revenues, 1963-80

1963  45.8%  14.4%
1964  44.0%  17.0%
1965  16.0%  19.6%
1966  26.0%  17.9%
1967  45.1%  15.9%
1968  44.6%  16.3%
1969  61.0%  20.2%
1970  46.1%  17.9%
1971  45.2%  17.1%
1972  42.3%  18.5%
1973  43.6%  19.7%
1974  44.2%  19.2%
1975  48.9%  16.7%
1976  49.5%  18.7%
1977  51.0%  16.2%
1978  49.9%  15.5%
1979  50.5%  15.6%
1980  60.6%  13.5%

Where:

- Coal
- Steel

coastal shipping) of transporting the freight of its principal customers serves to intensify competitive risks of this market.

Indeed, numerous studies made before and during the period under review support this allegation. Thus, Bonavia (1954) observed that there was competition in U.K. freight and passenger traffic. This was despite expressing reservations about both (a) the railways' basis of charging (op.cit., p.111), which was unrelated to market conditions until 1968 (as noted above), and (b) Government intervention (op.cit. p.181). Further evidence of an indirect nature is contained in Pryke's (1971) analysis of U.K. nationalised industries. Pryke blamed freight pricing policies which were unrelated to both the costs of carriage and to market conditions, for the consequent loss of traffic to road haulage (op.cit. pp.53 and 54). This view of the freight market is confirmed by Hunter and Thomson's (1973) analysis, in which they noted the high proportion of heavy consignments over long hauls of 200 miles or more which were carried by private hauliers (op.cit. p.146). This carriage of freight which B.R. could technically have conveyed is further evidence of the competitive nature of this market. Similarly, within the passenger market, Hunter and Thomson concluded that railways faced intense competition from the rise in car ownership, express buses and the airlines (p.154). This picture of competition in inland transport is repeated in the findings of the Independent Commission on Transport (1974), on passenger traffics (p.225 and passim) and on freight (particularly p.227, p.229, pp.248-250). Similar conclusions
on the nature of the transport market, both freight and passenger, have also been reported upon by Pryke and Dodgson (1975; passenger, pp.36,37; freight, pp.94,96). Therefore, the viewpoint of B.R. is sustained that (despite its statutory monopoly) it actually operates in competitive conditions. This leads to consideration of the second aspect of the market pressures upon B.R., i.e. the state of the economy.

2. THE STATE OF THE ECONOMY

The influence of this perceived factor on B.R.'s reported financial results is examined in the same manner as the previous 'risk factor'. That is, the reasons cited by B.R. as to why this might be considered a business risk are set out first of all, then the importance of these claims is evaluated. The scrutiny of B.R.'s annual reports revealed the following ways in which the state of the economy was so perceived by B.R.:

(i) The impact of the level of personal disposable income on passenger traffic

(ii) The influence of the level of industrial activity on freight traffic

4 However, one limited piece of evidence to the contrary is that by Jenkins et al., (1981), who present negative findings on the existence of competition between rail and air travel between London and Scotland.


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Both of these themes are very similar. Thus, regarding passenger traffic, B.R. has maintained that its volume of business is significantly influenced by movements in personal disposable income (1965, 1968, 1969, 1971, 1975, 1976 and 1980). A similar claim regarding freight traffic is that industrial recession adversely affects the volume of traffic carried (1967, 1970, 1971, 1972, 1975, 1976, 1977, 1980). A further claim regarding freight traffic is that the principal customers of B.R. are subject to severe fluctuations in production with significant consequences for railfreight (1963, 1966, 1975, 1977, 1980). Furthermore, B.R. has frequently cited the impact of such fluctuations, specifically in the coal and steel industries (traditionally its most important customers), on railfreight. Thus, in general, B.R. has reported that increases in coal produced and consumed have resulted in increases in railfreight (1963, 1968) and vice-versa (1965, 1967, 1971). Only in one year did B.R. report an increase in coal carried, despite an overall fall in coal consumption (1975). Similarly, B.R. has reported that reductions (1963, 1966, 1967, 1971, 1975, 1980) and increases (1964, 1965, 1968) in steel production resulted in considerable fluctuations in its railfreight. Therefore, these claims can be seen to accentuate the findings of the previous section. That is, not only does B.R. operate in a competitive market (for both freight and passenger operations), but its operations are subject to cyclical fluctuations (particularly freight) in general economic activity, which reinforces the likelihood of variability of returns.
and, therefore, the extent to which B.R. is exposed to business risk. The strength of these claims is assessed below.

(i) The impact of the level of personal disposable income on passenger traffic

The B.R. viewpoint that the level of its passenger traffic is affected by changes in personal disposable income (P.D.I.) is examined in three stages. First, changes in P.D.I. are compared with those of expenditure on all inland passenger transport. Secondly, the index of changes in expenditure on inland passenger transport is disaggregated into the alternative modes and compared with P.D.I. Finally, rail expenditure is itself disaggregated into its separate components of full fare, reduced fare and season ticket travel, which are then compared to changes in P.D.I. At each of these three stages, a comparison is made on the basis of (a) an inspection of the changes in the series under consideration and (b) the results of a simple linear regression, in which P.D.I. is the explanatory variable. Part (b) merely supplements (and confirms) part (a), the visual inspection. It is not intended to suggest here that the essentially qualitative analysis of B.R.'s annual reports permits the precise specification of relationships between the state of the economy and B.R.'s level of activity. The findings of each stage of this examination reveal only limited evidence in support of any positive relationship between changes in P.D.I. and in passenger transport, in general, or, indeed, in specific modes, or in specific types of rail travel.
As figure 7.2 shows, there have been quite marked fluctuations in P.D.I. during the period studied. However, this figure indicates only a weak relationship between changes in P.D.I. and those in total expenditure on passenger transport. This finding is supported by a simple linear regression, with $R^2$ at .27 (see table 7.5). A closer examination of the data represented in figure 7.2 reveals why this is so. For example, there was an increase in expenditure on passenger transport in 1967, but a decrease in P.D.I. in the same year. Also, a similar divergence occurred in 1977. On the positive side, there are changes common to both indices of a positive nature in the 1960's and early 1970's, followed by a severe dip in 1973-75 (1976, too, in the case of inland passenger transport) and a sharp recovery in the late 1970's. Overall, however, this figure shows that changes in expenditure on inland passenger transport only correspond very broadly to changes in P.D.I.

However, the evidence presented in figure 7.2 is not, in itself, conclusive as the index of changes in expenditure on inland passenger transport is an aggregate which obscures the significance of changes in personal disposable income to B.R. Therefore, a disaggregation of the components of the index on inland passenger transport are related to changes in personal disposable income in figure 7.3. It is evident from this figure that none of these components exhibits a pattern which closely follows that of changes in P.D.I. This is supported by a simple linear regression of changes in railway passenger expenditure and P.D.I. ($R^2 = .01$); bus and coach expenditure and P.D.I. ($R^2 = .004$); and motoring expenditure and P.D.I. ($R^2 = .01$) - see table 7.5. Each of these is now assessed, in turn.

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Figure 7.2  Changes in personal disposable income* and expenditure on all inland passenger transport, 1964-79.

* at 1975 prices.

Source: Compiled from Transport Statistics Great Britain and Economic Trends.
Table 7.5  The Relationship of Changes in Personal Disposable Income (P.D.I.) and in Passenger Traffic (1964-79); A Summary of Simple Linear Regression Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>r</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>y</td>
<td>x</td>
<td>a</td>
</tr>
<tr>
<td>1. Expenditure on Inland Transport</td>
<td>P.D.I.</td>
<td>2.09</td>
<td>.70</td>
</tr>
<tr>
<td>2. Expenditure on:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Motoring</td>
<td>P.D.I.</td>
<td>4.69</td>
<td>.165</td>
</tr>
<tr>
<td>(b) Bus and Coach</td>
<td>P.D.I.</td>
<td>.239</td>
<td>-.065</td>
</tr>
<tr>
<td>(c) Rail Travel</td>
<td>P.D.I.</td>
<td>1.085</td>
<td>.261</td>
</tr>
<tr>
<td>3. Railway Passenger Receipts for:</td>
<td>P.D.I.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Full Fare</td>
<td>.436</td>
<td>.016</td>
<td>.01</td>
</tr>
<tr>
<td>(b) Reduced Fare</td>
<td>.687</td>
<td>.63</td>
<td>.333</td>
</tr>
<tr>
<td>(c) Season Ticket</td>
<td>5.27</td>
<td>-.366</td>
<td>-.244</td>
</tr>
</tbody>
</table>

Source: compiled from the data used to construct figures 7.2 to 7.4.
Figure 7.3
Changes in personal disposable income* and in expenditure on motoring, bus and coach* and rail* travel, 1964-79.

*AT 1975 prices.

Sources: Compiled from Transport Statistics Great Britain and Economic Trends.
Expenditure on railway passenger transport in the mid-60's shows reductions from year to year when there is modest growth in P.D.I.; its recovery in 1968 is greater and more sustained than the increases in P.D.I. at that time; its fall from 1971 to 1974 precedes, and is more severe than, that in P.D.I. and its recovery in 1975 is at a time when P.D.I. is decreasing. Indeed, only in 1978-79 are there signs of consistency in movements of them both. This lack of any consistent relationship with changes in P.D.I. is not confined to railway passenger expenditure. Similar results are evident for expenditure on bus and coach travel. In particular, this is the case in the early 1970's when expenditure on bus and coach travel experienced significant reductions (when P.D.I. was rising) and in the mid-70's when expenditure on bus and coach was peaking (and P.D.I. was in decline). Also, expenditure on motoring was unrelated to changes in personal disposable incomes in the 1960's and late 1970's when it increased as P.D.I. decreased and vice-versa. However, it did experience a sharp fall similar to that for P.D.I. in 1974-76.

This inconsistency between changes in P.D.I. and total expenditure on railway passenger transport is confirmed by a disaggregation of such expenditure into full fare, reduced fare and season ticket travel (see figure 7.4). A simple linear regression further underlines this. Thus, for changes in expenditure on full

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7 As these are examined as alternative forms of transport, motoring costs refer to running costs (i.e. petrol, oil, repairs, servicing, insurance, road tax, garage rents and parking) but exclude the purchase of cars, thereby providing a measure of opportunity cost in the short run.
fare and P.D.I., $R^2 = .0001$; expenditure on reduced fare and P.D.I., $R^2 = .11$; expenditure on season tickets and P.D.I., $R^2 = .06$ (see table 7.5). As figure 7.4 shows, a similar pattern of changes in P.D.I. and all three of these measures of railway passenger transport is only evident from 1976-1979. At other times during the period 1964-1979 there is little evidence of a detectable pattern which applies to all four indices.

Thus, for full fare receipts, the troughs (1966-68, 1972-74) and peaks (1965, 1969-71, 1975) in their changes from year to year do not correspond to changes in P.D.I. Also, changes in season ticket travel exhibit an almost inverse relationship to those of P.D.I. Thus, its peaks (1969-72, 1974-76) correspond to troughs in P.D.I. and its troughs (1966, 1968, 1973) generally correspond to increases in P.D.I. Indeed, it is only the annual changes in reduced fare traffic which offer a broad correspondence to changes in P.D.I. Even here, there are instances of decreases in this index when P.D.I. is increasing (1968, 1970, 1972) and more accentuated increases in reduced fare traffic than those of P.D.I. in the same or the immediately following/preceding years (1969, 1973, 1978). Overall, therefore, evidence of a positive relationship between changes in P.D.I. and rail passenger traffic is limited in time (1976-79). This suggests that inter-modal competition is of greater importance in determining the level of railway passenger traffic than fluctuations in the economy.
Figure 7.4 CHANGES IN PERSONAL DISPOSABLE INCOME* AND IN RAIL PASSENGER RECEIPTS FOR FULL FARE*,
REDUCED FARE* AND SEASON TICKET TRAVEL*, 1960-79.

WHERE:

\[ \Delta \text{ Full Fare} \]
\[ \Delta \text{ Reduced Fare} \]
\[ \Delta \text{ Season Tickets} \]
\[ \Delta \text{ Personal Disposable Income} \]

*At 1975 prices.

Source: Compiled from Transport Statistics Great Britain and Economic Trends.
The influence of the level of industrial activity on freight traffic

By way of contrast, the evidence on B.R.'s freight traffic is more supportive of the riskiness of this part of B.R.'s operations. Thus, B.R.'s contentions that (a), in general, its freight traffic fluctuates with the state of the economy and (b), that those industries which are its principal customers are themselves subject to severe fluctuations in activity, which, in turn, results in fluctuations in its freight traffic, are broadly upheld. Both of these aspects of the riskiness of B.R.'s freight operations are considered below. This analysis is made in a comparable fashion to that of passenger traffic, i.e. visual inspection of a given pair of variables, plus reference to a simple linear regression of them. Once again, it is important to note the limitations of this regression analysis. The data from which relationships have been identified are essentially qualitative and the regression analysis merely supports commentaries on this data. No claim is made that the interpretations of B.R.'s comments in such regression equations represents precise specifications of the relationship between its freight traffic and the level of industrial activity.

As figure 7.5 demonstrates, there is no exact relationship between changes in industrial production and those in B.R.'s total freight, and these indices only broadly correspond. The simple linear regression of these variables supports this, with $R^2 = .33$ (see table 7.6). Indeed, there are differences in the height of the peaks of change and, indeed, in the depth of the troughs. However, as the index of changes in industrial production is an aggregate one which
Figure 7.5 Changes in Industrial Production and in BR's Total Freight Carried, 1964-79

% CHANGE

YEAR 0 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79

* Based on indices for 1955 = 100.

Source: Compiled from Transport Statistics Great Britain and Economic Trends

Where:

- Industriat Production
- BR's Total Freight
Table 7.6 The Relationship of Changes in Industrial Activity and in B.R.'s Freight Traffic, 1964-79: A Summary of Simple Linear Regression Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>r</th>
<th>R^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>x</td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>1. Total Freight Carried</td>
<td>Industrial Production</td>
<td>-3.96</td>
<td>.92</td>
</tr>
<tr>
<td>2. Steel Freight</td>
<td>Crude Steel Production</td>
<td>-2.25</td>
<td>1.1</td>
</tr>
<tr>
<td>(a) Crude Steel Production</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b) Finished Steel Consumption</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Coal Freight</td>
<td>Coal Consumption</td>
<td>- .49</td>
<td>.967</td>
</tr>
<tr>
<td>4. All Ores and Minerals Carried</td>
<td>Mining and Quarrying</td>
<td>-3.48</td>
<td>.174</td>
</tr>
<tr>
<td>6. Manufactured Manufacturing Goods Carried</td>
<td>Manufacturing</td>
<td>-4.15</td>
<td>.491</td>
</tr>
<tr>
<td>7. Motor Vehicles Carried</td>
<td>Motor Vehicles Produced</td>
<td>-4.14</td>
<td>.239</td>
</tr>
<tr>
<td>8. Petroleum Freight</td>
<td>Petroleum Consumption</td>
<td>1.69</td>
<td>1.55</td>
</tr>
</tbody>
</table>

Source: compiled from the data used to construct figures 7.5 to 7.11.
does not reflect the composition of B.R.'s total freight, too much significance cannot be attached to this. Nevertheless, as the following figures reveal, the disaggregation of B.R.'s freight traffic into its principal components provide results which are more supportive of B.R.'s view than those so far presented at the aggregate level.

In the first instance, it is evident from figure 7.6 that both crude steel production and finished steel consumption not only exhibit a severe cyclical pattern, but that B.R.'s steel freight also takes a very similar form. The simple linear regression of these relationships confirms this with B.R.'s freight and crude steel production having $R^2 = .85$ and B.R.'s freight of steel and finished steel consumption having $R^2 = .85$ (see table 7.6).

As regards the other major freight traffic, coal, the situation is somewhat more complex, but this, nevertheless, supports B.R.'s viewpoint. This is examined in two ways. First, changes in the standard index of activity in mining and quarrying is compared to changes in B.R.'s freight of such materials (coal and stones). This figure (7.7) is evidently too coarse a measure to detect the extent of fluctuation in coal mining on B.R.'s coal freight, but it nevertheless gives an indication of their possible impact. ($R^2 = .21$ - see table 7.6). Indeed, this points to sizeable fluctuations which B.R.'s freight follows, with the major exception of 1976-77, in which the peak in mining and quarrying activity is accompanied by a decrease in such freight by B.R. A second, more refined, measure of
Figure 7.6 Changes in Crude Steel Production, Finished Steel Consumption and BS's Steel Freight, 1964-79.

**Where:**
- \( \Delta \) BS's Steel Freight
- \( \Delta \) Crude Steel Production
- \( \Delta \) Finished Steel Consumption

*Based on indices with 1975 = 100.

**Source:** Compiled from Transport Statistics Great Britain and Economic Trends.
Figure 7.7  Changes in mining and quarrying and in BR's freight of such materials, 1964-79

**% CHANGE**

**YEAR**

**SOURCE**: Compiled from Transport Statistics Great Britain and Economic Trends

WHERE:
- Δ BR's Freight
- Δ Mining and Quarrying

*Based on indices with 1975=100
fluctuations in B.R.'s coal freight is contained in figure 7.8, which depicts changes in coal consumption and in B.R.'s coal freight. This reveals that there is a variability in coal consumption which is closely matched by that of B.R.'s coal freight. \( (R^2 = .64 \) - see table 7.6). Exceptions to this occurred in 1975 (as commented upon by B.R. itself, see above), in which B.R.'s freight increased at a faster rate than coal consumption, and in 1979, in which a dip in coal consumption was accompanied by an increase in coal freight.

Therefore, it can be seen that, in general, B.R.'s principal freights of coal and steel behave in a manner cited by B.R. Indeed, its lesser traffics also replicate these results. Thus, from figure 7.9, it is evident that there have been severe fluctuations in the volumes of petroleum consumed in the U.K. during this period and that these fluctuations have had a direct impact on B.R.'s petroleum freight. Indeed, the simple linear regression of changes in petroleum consumed and petroleum carried has \( R^2 = .75 \) (see table 7.6). However, while both motor vehicle production and B.R.'s motor vehicle freight have been subject to significant variability (see figure 7.10), there is no precise correspondence between them \( (R^2 = .1, \) see table 7.6). Thus, B.R.'s motor vehicle freight does not match the industry's production peak in 1968. Also, its freight of motor vehicles is on the upturn in 1979 when motor industry production had a reversal. Nevertheless, as noted above, there is considerable variability in B.R.'s motor vehicle freight.
Figure 7.8  Changes in coal consumption and BR's coal freight, 1964-79

WHERE:

- \( \Delta \) BR's coal freight
- \( \Delta \) coal consumption

* Based on indices with 1975 = 100.

Source: Compiled from transport statistics, Great Britain and economic trends.
**Figure 7.9**

Changes in Petroleum Consumption and in BSI's Petroleum Freight, 1969-79

WHERE:

- △ BSI's Petroleum Freight
- △ Petroleum Consumption

*Based on indices with 1975 = 100.

Figure 7.10 Changes in Motor Vehicle Production and BR's Motor Vehicle Freight, 1965-79*

WHERE:

- Δ BR's Motor Vehicle Freight
- Δ Motor Vehicle Production

* Based on indices with 1975 = 100.

Source: Compiled from Transport Statistics Great Britain and Economic Trends.
Finally, figure 7.11 sets out the changes in construction and in B.R.'s freight of building materials for this period. This shows that changes in B.R.'s freight of such materials does not exactly match up with those in total U.K. construction. Indeed the simple regression analysis of these variables has $R^2$ at .04 (see table 7.6). However, it is evident from this that that part of the construction market which has been carried as freight by B.R. was subject to severe fluctuation during the period studied. Indeed, these fluctuations were greater than those of the construction industry as a whole. Therefore, B.R.'s view that its railfreight business is one which is particularly vulnerable to business risk, as expressed by movements in the trade cycle and slumps and peaks in the production of particular industries, is vindicated.

3. CONCLUSION

This chapter has sought to demonstrate whether or not B.R. faces competitive pressures which contribute to variability in its reported operating revenues. The existence of such pressures can be interpreted as necessary (but not sufficient) evidence regarding the existence of business risk at B.R. Such evidence lends support to the introduction of risk capital at B.R. However, the evidence presented in this chapter also has wider implications for policy makers regarding the nature of B.R. per se and of the inland transport market.

Two basic types of market pressures were examined: 1, the nature of the markets served and 2, the state of the economy. As regards the
Figure 7.11

Changes in construction and in BR's freight of building materials, 1964-79.*

WHERE:

- \( \Delta \text{BR's freight} \)
- \( \Delta \text{construction} \)

* Based on indices with 1975 = 100.

SOURCE: Compiled from transport statistics, Great Britain and economic trends.
first of these, evidence was presented of competitive pressures in both B.R.'s passenger and freight markets. Thus the demand for inter-city rail services exhibits the characteristics of price elasticity. Similarly, there is evidence of a moderately high cross-elasticity of demand for B.R.'s other passenger services. A distinctive attribute of B.R.'s freight market is its reliance on a limited number of customers. This risky aspect of B.R.'s freight operations is exacerbated by the existence of numerous competitors.

However, the second aspect of market pressures cited by B.R., i.e. the state of the economy, has a less even impact. As regards the passenger market, there is no consistent, clearly discernible relationship between the level of available personal disposable income and levels of expenditure on all forms of inland passenger transport. Indeed, there is only limited evidence pointing to such a relationship, which is confined to the period 1976-79. On the other hand, there is considerable evidence of fluctuations in the levels of activity in those industries which form the backbone of B.R.'s freight business, with, in general, the direct consequence of a corresponding variability in its freight traffic.

In conclusion, there is evidence that the influence of market pressures on B.R.'s operations can be seen as a definite element of business risk. These findings also reaffirm the suggestion, in Chapters 2 and 5, that the reconstructed railway operating company can be regarded as a 'commercial' rather than a 'social' corporation. Furthermore, despite the interventions by Government in regulating the transport market (passenger and freight), it can be seen that there are sufficient market pressures to maintain a competitive environment.
Chapter 8

A QUALITATIVE ASSESSMENT: (B) INDUSTRIAL RELATIONS

As indicated in chapter 1 of this thesis, there were two facets of labour relations at B.R. which were repeatedly drawn to the attention of readers of its Annual Reports, and which might merit consideration as elements of business risk, viz.,

1. industrial unrest, and

2. difficulties in the attainment of improved productivity.

Both of these aspects of B.R.'s labour relations might obviously have a direct impact on its reported financial results, either by the loss of revenue or by the incurrence of costs higher than necessary to provide adequate services. Such labour problems are also of greater potential importance to B.R., relative to most other industries as it is labour-intensive. Indeed, as table 8.1 shows, B.R. is one of the three largest employers (with N.C.B. and the Post Office) within the major nationalised industries. The extent to which B.R. has proved to be vulnerable to such labour problems is assessed below. This suggests that, while B.R. has not been immune from strikes and other forms of industrial unrest, the strength of opposition to technical changes and schemes for productivity improvement from organised labour represents the single most important aspect of B.R.'s labour relations.
Table 8.1  Employment in Nationalised Industries as a Percentage of Total Manufacturing Industry Employment, 1960-80

<table>
<thead>
<tr>
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<th></th>
<th></th>
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<tbody>
<tr>
<td>British Airways</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>British Gas</td>
<td>1.7</td>
<td>1.6</td>
<td>1.6</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>British Rail</td>
<td>-</td>
<td>5.0</td>
<td>3.6</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>British Steel</td>
<td>-</td>
<td>-</td>
<td>2.6</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Electricity</td>
<td>2.5</td>
<td>2.8</td>
<td>2.6</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>N.C.B.</td>
<td>9.0</td>
<td>7.0</td>
<td>4.7</td>
<td>4.3</td>
<td>4.5</td>
</tr>
<tr>
<td>Post Office</td>
<td>-</td>
<td>5.0</td>
<td>5.4</td>
<td>6.2</td>
<td>6.4</td>
</tr>
<tr>
<td>National Bus</td>
<td>-</td>
<td>-</td>
<td>1.1</td>
<td>1.0</td>
<td>0.9</td>
</tr>
</tbody>
</table>

NOTES:


2 B.R.'s figures for 1970 and 1975 exclude Freightliner employees (respectively 0.9 percent and 0.7 percent of B.R.'s total workforce for these years), which were transferred to National Freight Corporation from 1968 to 1978.

3 England and Wales only.
1. INDUSTRIAL UNREST

The influence of industrial unrest on B.R.'s reported financial results is examined by setting out their occurrence, as reported, and then assessing their significance. The study of B.R.'s Annual Report and Accounts from 1963 to 1980 revealed the following fundamental dichotomy in the type of industrial action to which it perceived itself as being vulnerable:

(i) Internal disputes

(ii) External disputes

The first category included a general seaman's strike which affected B.R.'s shipping services (1966); disputes on the railways in response to pay and productivity negotiations (1967, 1968, 1979); unspecified industrial action on the railways (1974, 1978) and a comment regarding further unspecified, relatively minor, industrial action on the railways (1980). The second category, external disputes, referred to the effects of specific industries on B.R.'s freight operations. This included strikes in the following industries: the docks (1967, 1972); motor car manufacturers (1970, 1972); steel (1972, 1980); construction (1972); coal (1970, 1972, 1973). Further comments were made by B.R. regarding strike action in unspecified industries (1971, 1978). Therefore, as B.R. experienced

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disputes (internal and external) in 11 of the 18 years studied, it would appear to be prone to industrial unrest. On the face of it, therefore, this does indeed constitute an element of business risk at B.R. The validity of this view is assessed below for internal and external disputes, in turn.

(i) Internal disputes

As regards internal disputes, the frequency with which they are reported upon by B.R. in its Annual Reports need not, and, indeed, does not present an historical record of the actual incidence of such disputes. Even if it is assumed that it does represent a precise record, it is noteworthy that the first of these disputes (1966) was not only unrelated to mainstream railway activity, but it was also insignificant in terms of its financial consequences. Thus, on the latter point, B.R. reported (1966, p.1) that this strike had cost it gross receipts of £2.5 million and a net profit of £1 million. These amounts were, respectively, .47 percent and 3.6 percent of B.R.'s total revenues and total operating deficit for that year. Nevertheless, a priori, it is not unreasonable to expect that those disputes which B.R. felt compelled to comment upon in its Annual Report were most likely to be those of greatest significance in terms of their operational and financial impact. Furthermore, insofar as can be practicably assessed, the actual financial impact of these reported disputes suggests that their significance is limited.

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3 The actual incidence of industrial disputes at B.R. is considered below.
Thus, in 1967, B.R. reported two internal disputes in its Annual Report of that year. The first of these was a strike over the introduction of a change in working conditions at the London International Freight Terminal. B.R. estimated that this caused a loss of \textit{circa} £750,000. The second was a guards dispute during September and October of that year. The estimate which B.R. placed on the losses arising from this dispute was £1.5 million. However, while bearing in mind that the estimation of such losses cannot result in precise figures of their financial impact, it is interesting to note that, in total, they comprise 2.6 percent of B.R.'s total operating deficit of that year. This pattern is repeated for the other years in which B.R. reported internal disputes and for which it made estimates of their financial effects. Thus, of the five remaining years in which B.R. reported upon internal disputes, it estimated that a 1968 work-to-rule over pay and productivity negotiations cost it net profits of £1.7 million (1.93 percent of that year's operating deficit), however, industrial action on the railways in 1974 was estimated to cost £18 million (20.9 percent of that year's operating deficit). Since then, B.R. has ceased the practice of estimating (or at least, of publishing) the cost of such strikes. Of the last three reported internal disputes, the final one (in 1980) was described as being minor;
both the 1978 and 1979 disputes appeared to be unofficial strikes.  

Overall, therefore, on closer inspection a picture emerges of an industry which is not particularly disturbed by industrial unrest. Indeed, this is confirmed by a N.E.D.O. (1977) study of industrial relations in the nationalised industries. As the data collected by N.E.D.O. shows, B.R. is not a particularly strike-prone industry in comparison with the other principal nationalised industries, on the basis of the number of stoppages per 100,000 employees in the 1966-75 period (see table 8.2). It also compares favourably with the 'total manufacturing' and 'all industry' averages. Furthermore, the railways, as part of the transport sector of the economy, appear to be highly susceptible to industrial action. A study by Creigh and Makeham (1980) found that transport industries had the highest number of strikes per 100,000 employees in the period 1966-1973. Also, in terms of working days lost per 1,000 employees Creigh and Makeham discovered that the transport sector of the economy was second only to construction and mining. These results are summarised in table 8.3.

---

4 While the period under review is 1963 to 1980, it is appropriate to mention the two official strikes by A.S.L.E.F. in 1982. In both strikes A.S.L.E.F. was resisting the introduction of new working practices (flexible rostering) designed to improve labour productivity. It is estimated that these strikes cost B.R. £200 million (p.21, The Economist, July 24, No.7247, Vol.284). B.R.'s financial results for 1982 are not available at the time of writing, but the cost of this strike represents 9.6 percent of 1981's turnover (before subsidy); 6.8 percent of 1981's operating costs and 11.7 percent of 1981's staff expenses. This suggests that internal disputes may be more significant than indicated by those strikes which B.R. reported upon in the 1963-80 period.
Table 8.2  Industrial Disputes in Nationalised Industries:
Number of Stoppages per 100,000 employees - 1966-75

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>2.7</td>
<td>3.5</td>
<td>3.7</td>
<td>5.6</td>
<td>2.3</td>
<td>1.4</td>
<td>2.5</td>
<td>2.1</td>
<td>3.1</td>
<td>2.6</td>
<td>3.0</td>
</tr>
<tr>
<td>Gas</td>
<td>0.8</td>
<td>3.1</td>
<td>3.1</td>
<td>13.6</td>
<td>10.4</td>
<td>4.2</td>
<td>6.2</td>
<td>6.5</td>
<td>13.2</td>
<td>10.6</td>
<td>7.2</td>
</tr>
<tr>
<td>Railways</td>
<td>3.6</td>
<td>4.5</td>
<td>4.1</td>
<td>4.1</td>
<td>12.2</td>
<td>3.3</td>
<td>1.2</td>
<td>2.7</td>
<td>5.0</td>
<td>5.7</td>
<td>4.6</td>
</tr>
<tr>
<td>Post Office</td>
<td>0.0</td>
<td>0.2</td>
<td>0.7</td>
<td>0.7</td>
<td>2.5</td>
<td>1.8</td>
<td>0.7</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Steel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>19.3</td>
<td>31.5</td>
<td>32.8</td>
<td>34.4</td>
<td>25.9</td>
<td>38.1</td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td>108.6</td>
<td>81.3</td>
<td>52.0</td>
<td>48.9</td>
<td>44.8</td>
<td>39.0</td>
<td>67.9</td>
<td>95.4</td>
<td>62.1</td>
<td>69.9</td>
<td>67.0</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>10.1</td>
<td>14.1</td>
<td>17.1</td>
<td>22.9</td>
<td>31.0</td>
<td>18.2</td>
<td>21.4</td>
<td>23.7</td>
<td>24.6</td>
<td>18.6</td>
<td>20.2</td>
</tr>
<tr>
<td>All Industries</td>
<td>8.3</td>
<td>9.3</td>
<td>10.5</td>
<td>13.8</td>
<td>17.4</td>
<td>10.1</td>
<td>11.3</td>
<td>12.7</td>
<td>12.8</td>
<td>10.1</td>
<td>11.6</td>
</tr>
</tbody>
</table>

### Table 8.3  Industrial Action: An Occupational Analysis, 1966-1973

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Stoppages(^1)</th>
<th>Days Lost(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Professional - science, engineering</td>
<td>5.3</td>
<td>116.9</td>
</tr>
<tr>
<td>Clerical</td>
<td>0.3</td>
<td>224.7</td>
</tr>
<tr>
<td>Personal services (e.g. catering)</td>
<td>0.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Farming, fishing</td>
<td>0.4</td>
<td>16.9</td>
</tr>
<tr>
<td>Materials processing(^3)</td>
<td>2.5</td>
<td>14.1</td>
</tr>
<tr>
<td>Making and repairing(^4)</td>
<td>5.7</td>
<td>49.8</td>
</tr>
<tr>
<td>Processing, making, repairing</td>
<td>9.3</td>
<td>183.3</td>
</tr>
<tr>
<td>Painting, assembling</td>
<td>4.0</td>
<td>64.4</td>
</tr>
<tr>
<td>Construction, mining</td>
<td>17.1</td>
<td>1,424.2</td>
</tr>
<tr>
<td>Transport</td>
<td>19.0</td>
<td>369.6</td>
</tr>
</tbody>
</table>

\(^1\) Annual average of strikes per 100,000 employees.
\(^2\) Annual average of working days lost per 1,000 employees.
\(^3\) Excluding metal.
\(^4\) Excluding metal, electrical.

However, this measure, number of stoppages, excludes industrial action which falls short of strike action, such as 'work to rules' and bans on overtime, but which could be as damaging to an industry. A rough indication of the extent to which B.R. might be vulnerable to such industrial action can be made from table 8.4a, which shows the proportion of overtime in average weekly earnings for manual workers in the major nationalised industries. By taking overtime pay as a proxy for the extent to which the railway is reliant on overtime to provide its services, this provides a yardstick of the potential impact of a ban on overtime. As table 8.4a shows, for railway staff (other than footplate staff) this is considerably higher than most other nationalised industries and the 'all industry' average. Indeed, the N.E.D.O. study (op.cit., p.27) suggested that the railways have lost time through this type of action which would make its average of 4.6 stoppages per 100,000 employees in the 1966-75 period closer to that of the 'total manufacturing' average of 20.2 stoppages per 100,000 employees for this period. This would place railways in a similar category to that of steel and coal in terms of industrial unrest, rather than, say, the Post Office. It is also instructive to note that, in the abovementioned study by Creigh and Makeham, they found that only 2.6 percent of stoppages in the transport industry were declared to be official in the period 1966-73. This compares unfavourably with most other occupations, with the exception of construction and mining (0.4 percent) and materials processing, which also had 2.6 percent (see table 8.4b).
Table 8.4a  Overtime Pay as a Component of Average Weekly Earnings in State Industries

<table>
<thead>
<tr>
<th>Industry</th>
<th>1970</th>
<th>1975</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gas Supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- workers other than maintenance craftsmen</td>
<td>22.4</td>
<td>20.0</td>
</tr>
<tr>
<td>2. British Rail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- conciliation and miscellaneous staff</td>
<td>27.9</td>
<td>26.8</td>
</tr>
<tr>
<td>- footplate staff</td>
<td>13.3</td>
<td>11.8</td>
</tr>
<tr>
<td>3. British Steel Corporation</td>
<td>13.3</td>
<td>11.5</td>
</tr>
<tr>
<td>4. Electricity Supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- workers other than building operatives</td>
<td>8.8</td>
<td>7.7</td>
</tr>
<tr>
<td>5. Coal Mining</td>
<td>13.8</td>
<td>15.6</td>
</tr>
<tr>
<td>6. Post Office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- engineering grades</td>
<td>15.6</td>
<td>13.2</td>
</tr>
<tr>
<td>- manipulative grades</td>
<td>21.8</td>
<td>23.0</td>
</tr>
<tr>
<td>7. Company-owned bus undertakings</td>
<td>29.1</td>
<td>24.0</td>
</tr>
<tr>
<td>8. British Road Services</td>
<td>-</td>
<td>30.5</td>
</tr>
<tr>
<td>9. Civil Air Transport</td>
<td>-</td>
<td>12.7</td>
</tr>
<tr>
<td>10. All Industries</td>
<td>16.4</td>
<td>14.3</td>
</tr>
</tbody>
</table>

Source: Compiled from N.E.D.O. Background Paper 4, op.cit.
Table 8.4b Official Industrial Action: An Occupational Analysis, 1966-1973

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Percentage of Stoppages Known To Be Official</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>16.7</td>
</tr>
<tr>
<td>Professional - science, engineering</td>
<td>16.9</td>
</tr>
<tr>
<td>Clerical</td>
<td>19.3</td>
</tr>
<tr>
<td>Personal services (e.g. catering)</td>
<td>4.1</td>
</tr>
<tr>
<td>Farming, fishing</td>
<td>11.1</td>
</tr>
<tr>
<td>Materials processing&lt;sup&gt;1&lt;/sup&gt;</td>
<td>2.6</td>
</tr>
<tr>
<td>Making and repairing&lt;sup&gt;2&lt;/sup&gt;</td>
<td>4.6</td>
</tr>
<tr>
<td>Processing, making, repairing</td>
<td>3.5</td>
</tr>
<tr>
<td>Painting, assembling</td>
<td>3.5</td>
</tr>
<tr>
<td>Construction, mining</td>
<td>.4</td>
</tr>
<tr>
<td>Transport</td>
<td>2.6</td>
</tr>
</tbody>
</table>

<sup>1</sup> Excluding metal.
<sup>2</sup> Excluding metal, electrical.

Source: Creigh and Makeham, op.cit.
In conclusion, the assessment of the significance of internal disputes is a complex affair. In the first instance, reported disputes seem to occur so regularly as to suggest that this is indeed a business risk faced by the railways. On closer inspection, however, the financial impact of such reported disputes appears to be slight.\(^5\) B.R. also appears to be less prone to stoppages than many other nationalised industries. However, there is the caveat to this that unofficial industrial action appears to be so persistent as to confirm the initial conclusion, that B.R. is indeed vulnerable to internal industrial action.

(ii) External disputes

As for external disputes, B.R.'s comments highlight twelve instances of serious industrial action, some of which took place in the same year. However, a mere listing of those reported upon by B.R. does not provide an adequate yardstick of their significance. Also, just as was the case with internal disputes, the financial impact of such industrial unrest can only be assessed piecemeal. Nevertheless, available estimates add some depth to the bare count of actual external disputes. Thus, in 1970, B.R. estimated that a coal strike had resulted in a reduction of its carriage of coal by some 2 million tons. As the average receipt per ton of coal carried was £0.85 at this time (B.R., 1970, p.8), this loss of output

\(^5\) With the exception of one year (1974) reported upon by B.R., (as noted above) and its 1982 strike, see footnote 2 above.
represented £1.7 million in receipts or .82 percent of B.R.'s total freight revenue for that year. B.R. also made no estimate of its loss of revenue arising from the strike in the car industry in that year. However, in the following year, B.R. estimated that industrial action in other industries had lost it receipts of £30 million or 15.5 percent of its total freight revenue for 1971 (B.R., 1971, p.1). Most recently, the steel strike of 1980 was estimated by B.R. to have cost it £25 million in revenues or 5.5 percent of total freight receipts (B.R., 1980, p.26). Therefore, incomplete as this information is, it points to the possibility that B.R. is indeed vulnerable to such disputes.

Indeed, closer inspection of available evidence substantiates this viewpoint. There are two aspects to this. In the first instance, B.R., as a specialised haulier of freight traffic, appears to be sensitive to the incidence of strike activity in a limited number of industries: the docks, coal, steel, motor manufacturing and construction. Furthermore, within this particular grouping, there are two industries which have dominated B.R.'s freight traffic throughout its existence. Thus, as figure 7.1 showed, the freight of both coal and steel forms the backbone of B.R.'s freight business. Secondly, within this narrow group of industries, the incidence of industrial unrest is exceptionally high. Thus, some of B.R.'s principal customers were so described in an early investigation of U.K. industrial relations. In this report it was stated that the

6 Royal Commission on Trade Unions and Employers Associations (Donovan Report), June, 1968, Cmnd. 3623.
strike records of different industries varied markedly, some were relatively 'immune', others had high levels of industrial unrest. The four industries with the consistently poorest record over the period 1964-66 were found to be: coal mining, the docks, shipbuilding and motor vehicle manufacture, in terms of unofficial strikes, which accounted for some 95 percent of total strikes (see table 8.5). Furthermore, as was shown in table 8.2, if days lost per 100,000 workers through stoppages and disputes is taken as a measure of the incidence of industrial unrest, only two nationalised industries have records which are consistently worse than the average for all nationalised industries and the average for manufacturing industry in the period 1966-1975 - coal mining and steel. These are, of course, B.R.'s principal customers for freight traffic. Therefore, it can be seen that this influence of external disputes can be rightly regarded as an element of business risk at B.R.

2. THE PURSUIT OF PRODUCTIVITY

The extent to which B.R. (or, indeed, any organisation) cannot achieve labour productivity will evidently influence its reported financial results. This is particularly true, of course, in the case of a labour-intensive corporation such as B.R. This theme is one which has been persistently reported upon by B.R. Thus scrutiny of B.R.'s Annual Reports uncovered the following aspects of this issue in the 1963-80 periods:
Table 8.5  Average Annual Figures Relating to Industries in which Most Unofficial Strikes took Place in Relation to Numbers Employed, 1964-66

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number of unofficial strikes per 100,000 employees</th>
<th>Number of days lost in unofficial strikes per 1,000 employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal Mining</td>
<td>138.7</td>
<td>466</td>
</tr>
<tr>
<td>Docks</td>
<td>62.1</td>
<td>850</td>
</tr>
<tr>
<td>Shipbuilding</td>
<td>43.7</td>
<td>379</td>
</tr>
<tr>
<td>Motor Vehicle</td>
<td>30.9</td>
<td>798</td>
</tr>
<tr>
<td>Manufacture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Industries</td>
<td>9.2</td>
<td>72</td>
</tr>
</tbody>
</table>

Source: Donovan Report, op.cit., p.98.
(i) Attempts, methods and difficulties of achieving productivity gains

(ii) Level of labour costs

The first of these reveals a mixed response to B.R.'s attempts to introduce greater productivity. There are occasional references to improved productivity. Thus, in 1964, B.R. reported an increase in traffic carried (measured as a combination of passenger and ton miles) of 3.6 percent over the previous year and a reduction in manpower of 8.5 percent. This was interpreted by B.R. as representing an increase in productivity of 'about 13 percent'. Similarly, in 1970, B.R. reported upon a 50 percent reduction in staff in the 1960-70 period which had allowed changes in working methods and greater 'versatility' in the use of labour. This message was repeated in 1976, in which year B.R. reported a 'continuing progress' in manpower reduction with the 'help of trade union colleagues'. There is also a contradictory message in 1975. On the one hand, B.R. reported a reduction in output of 6 percent which was achieved with a disproportionate reduction in resources utilised (labour-numbers employed reduced by 9 percent; manhours worked reduced by 17 percent; fleet sizes - passenger carriages reduced by 12 percent, freight wagons by 42 percent, locomotives by 14 percent) in the period 1970-75. On the other hand, within the same report, it stressed that there was still a '...pressing need to redeploy staff, encourage


mobility and achieve a run-down in numbers....' (B.R., 1975, p.19). This latter comment is in line with the general trend of B.R.'s comments which report negative results in its attempts to secure increases in labour productivity - a picture which is only relieved by isolated instances of productivity gains.

Thus, in 1968, B.R. acknowledged a need to use its manpower more effectively, but stated that this was 'not easy to achieve' (p.2). Ten years later, regarding the effective use of manpower, B.R. reported that it had "..... identified sizeable opportunities for improvements, but the blunt truth is that we have not been able to negotiate these into reality ....." (B.R., 1978, p.5). In 1979, B.R. reported that it still had inefficiencies, that its productivity agreements of that year had failed (B.R., 1979, p.6) and that a change of attitudes was required to achieve the necessary changes in working methods (B.R., 1979, p.10). In the following year, B.R. continued to report a failure to negotiate changes in conditions of service and working practices (B.R., 1980, p.22). Within these negative findings, however, there were limited positive results: staff engaged in track renewal agreed to include Sundays, their busiest day, as part of their standard working week (1979, p.20); within the same aspect of railway operations, B.R. reported upon the acceptance of improved techniques and modernisation (1980, p.29), B.R. also reported upon further reductions in numbers employed (1980, p.22).

The second category of comments, level of labour costs, also relates to B.R.'s attempts to improve its productivity. Thus B.R.
has expressed the views that wage levels were not warranted by productivity achievements (1965, 1968); that it has been confronted with high costs, of which increased labour costs form the most significant contribution (1970, 1971); and, indeed, that almost its entire traffic revenue has been used to pay its wages bill (1975). The significance of these inter-related aspects of the pursuit of improved productivity at B.R. are assessed, in turn, below.

(i) Productivity

As regards the extent to which labour productivity was actually improved in this period, a crude indication is provided by reductions in manpower. Thus, as table 8.6 shows, in the period 1963-1980, B.R. had shed 224,606 staff or 48.4 percent of its 1963 work force. On the face of it, therefore, there appears to have been a significant reduction. However, the importance of this rate of reduction rests on the appropriateness of the initial establishment of 464,286. There is reason to believe that this was in excess of the size of the work force required. Indeed, B.R.'s protestations in its Annual Reports, particularly in the 1970's, are indicative of this. However, there have also been attempts to provide targets which might precisely set out attainable rates of reduction to something approaching an optimal size of labour force. Thus, Pryke and Dodgson (1975, p.176) advocated a railway labour force of 152,920 in 1981. This represents a reduction of 66,680 on the railway labour force of 1974, when this estimate was made. This proposed reduction was based on the
Table 8.6  B.R.: Average Numbers of Staff Employed, 1963-1980

<table>
<thead>
<tr>
<th>Year</th>
<th>All Employees ¹</th>
<th>Railways Salaried</th>
<th>Railways Wages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>464,286</td>
<td>44,577</td>
<td>344,974</td>
</tr>
<tr>
<td>1964</td>
<td>422,167</td>
<td>88,946</td>
<td>310,059</td>
</tr>
<tr>
<td>1965</td>
<td>387,663</td>
<td>84,935</td>
<td>280,108</td>
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<tr>
<td>1966</td>
<td>360,696</td>
<td>81,772</td>
<td>257,179</td>
</tr>
<tr>
<td>1967</td>
<td>339,442</td>
<td>79,134</td>
<td>238,958</td>
</tr>
<tr>
<td>1968</td>
<td>317,478</td>
<td>76,163</td>
<td>220,111</td>
</tr>
<tr>
<td>1969²</td>
<td>275,469</td>
<td>64,857</td>
<td>188,758</td>
</tr>
<tr>
<td>1970</td>
<td>273,063</td>
<td>58,696</td>
<td>154,540</td>
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<tr>
<td>1971</td>
<td>264,061</td>
<td>52,591</td>
<td>149,083</td>
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<tr>
<td>1972</td>
<td>256,007</td>
<td>51,770</td>
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<td>250,083</td>
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<td>1974</td>
<td>255,902</td>
<td>52,444</td>
<td>142,447</td>
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<tr>
<td>1975</td>
<td>251,627</td>
<td>51,794</td>
<td>138,137</td>
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<tr>
<td>1976</td>
<td>243,476</td>
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</tr>
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<td>1977</td>
<td>240,073</td>
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<td>129,726</td>
</tr>
<tr>
<td>1978</td>
<td>243,264</td>
<td>52,322</td>
<td>129,876</td>
</tr>
<tr>
<td>1979</td>
<td>244,084</td>
<td>52,637</td>
<td>129,394</td>
</tr>
<tr>
<td>1980</td>
<td>239,680</td>
<td>51,949</td>
<td>126,110</td>
</tr>
</tbody>
</table>

¹ Including non-rail employees

² In 1969, 26,000 employees of B.R. were transferred to the National Freight Corporation, which had been formed under the 1968 Transport Act.

introduction of automatic ticket barriers, thereby saving on ticket collectors; the reduction of station staff by the introduction of payguards and dispensing with freight guards, particularly where the train is lightly loaded or has power doors. Furthermore, B.R. itself produced a scheme for the reduction of its staff which covered the latter part of the period studied. Its proposals were more modest than those of Pryke and Dodgson, but they nevertheless identified opportunities for reducing its railway labour force by some 39,400-43,000. However, the impact of these proposals has proved to be negligible. Thus, in the period covered by these planned reductions in staff (1975-80), B.R.'s employment has only reduced by 11,947. This is a significant failure, whether the shortfall is measured against Pryke and Dodgson's or B.R.'s proposed reductions. This inability to achieve the desired level of reductions in manpower provides a measure of the strength and intransigence of organised labour at B.R.

However, as noted earlier, the reductions in labour achieved are only a crude measure of improvements in productivity. To achieve gains in labour productivity, these reductions in manning levels should be accompanied by a constant or increasing output from British Rail. This is not straightforward. Not only is the measurement of railway output somewhat difficult, but the inference of labour productivity from levels of output and staffing represents an oversimplification of the relationship between inputs and the level of output.
of service provided. Thus, the level of activity at B.R. is affected by exogenous factors, such as the level of activity in the steel and coal industries (for freight) and of personal disposable income (for leisure travel).\(^{10}\) Also, the quality of capital inputs (for example, an advanced passenger train v. a diesel or electrified v. non-electrified line) might also be expected to influence level of activity. Therefore, in any closer inspection of the strength of organised labour at B.R., as measured by indices of productivity, these factors must be borne in mind.

The actual indices of labour productivity used here are (a) that utilised by B.R. (1964, p.l), which combined percentage changes in numbers employed with percentage changes in railway output (measured by passenger miles plus net ton miles) and (b), a 'net output' index, in which percentage changes in numbers employed are combined with a more refined measure of output. In this latter index, the different categories of railway traffic are explicitly included. Thus, passenger miles for ordinary fares, reduced fares and season tickets, plus net ton miles for coal, steel and other freight traffics are combined with B.R.'s non-rail activities. These components are expressed in 1970 prices, with a weighting according to their respective shares of gross revenue in 1970. Given the above reservations about such measures, the indices selected are best interpreted as broad indicators rather than precise representations of movements in productivity. These indices, plus the percentage changes in average numbers employed at B.R., are shown in figure 8.1.

\(^{10}\) As discussed above in Market Pressures.
Figure 8.1  Productivity at British Rail, 1964-80.

**WHERE:***

- **X--X--X--**: % change in numbers employed.
- **O--O--O--**: % change in numbers employed, plus % changes in net ton miles and passenger miles.
- ***--*--*--**: % change in numbers employed, plus % changes in net output index (as defined in main text).

**Source:** Compiled from BR Annual Report and Accounts, 1963-80.
All three measures set out in figures 8.1 are affected by the transfer of 26,000 employees from B.R. to the newly created National Freight Corporation, in 1969. Therefore, the peak in this year, plus the fall in the following year must be interpreted with extreme caution. Nevertheless it is evident from this figure that focussing simply on changes in numbers employed presents a very different picture to that obtained by the other indices selected. The use of changes in numbers employed as a measure of productivity reveals a clear dichotomy, with moderate gains until 1969, followed by negligible changes in the remaining period. However, this obscures the fact that these changes in numbers employed were happening against a background of fluctuations in output. Both of the other indices shown, the 'B.R.' index and the net output index, display a similar pattern, although the 'B.R.' index is somewhat shallower. The pattern depicted by these indices contrasts with that of changes in numbers employed. Thus, there is a high initial increase in productivity, which falls off in the rest of the 1960's; a peak in productivity in 1969 (affected by the N.F.C. figures mentioned above); and, finally, falls in productivity in the 1970's, punctuated by two reversals of this trend in 1973 and 1978-79. Thus, on the one hand, these indices demonstrate that the levelling off in numbers employed in the latter period did not reveal these significant increases in productivity in 1973 and 1978-79. On the other hand, however, the stability in numbers employed also hid the underlying trend of falling productivity for much of this period. Therefore,
B.R.'s protests regarding its failure to achieve improved productivity on the basis of average numbers employed are not without defects, but its basic stance appears to be justified.

(ii) Level of labour costs

The second barrier to B.R.'s attempts to improve productivity, the level of labour costs, is now examined. B.R.'s basic message regarding such costs was that they were unduly high (1970, 1971, 1975) and were unrelated to productivity (1965, 1968). It is shown below that both of these issues might properly be regarded as barriers to productivity at B.R. Each aspect is considered, in turn.

There are a number of ways in which it is possible to assess the allegation that B.R.'s labour costs have been 'unduly high', most of which present a consistent viewpoint on this matter. One such measure is the rate of increase in earnings of railway workers relative to those of comparable groups. The long-established October Earnings Survey by the Department of Employment (D.E.), which reports upon average earnings for manual workers in one week in October every year, provides some preliminary evidence on this. Thus, it enables the rate of increase in average earnings of full-time manual workers at B.R. from 1964 to 1980 to be compared with that of the nationalised industries (table 8.7) and that of private sector industries (table 8.8). This latter table contains the rates of increase in earnings in two key industries (shipbuilding and motor manufacture) which have been pinpointed above as being particularly susceptible to industrial unrest, plus averages for manufacturing
Table 8.7  
Annual Increases in Average Weekly Earnings of Full-Time Manual Men:1 Railways and Selected Nationalised Industries, 1964-80

<table>
<thead>
<tr>
<th></th>
<th>Railways</th>
<th>Gas</th>
<th>Electricity</th>
<th>Bus</th>
<th>Coal</th>
<th>Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>8.2</td>
<td>6.1</td>
<td>9.9</td>
<td>6.8</td>
<td>5.2</td>
<td>8.7</td>
</tr>
<tr>
<td>1965</td>
<td>11.1</td>
<td>11.8</td>
<td>-0.2</td>
<td>9.7</td>
<td>7.5</td>
<td>8.7</td>
</tr>
<tr>
<td>1966</td>
<td>12.9</td>
<td>4.0</td>
<td>3.8</td>
<td>6.4</td>
<td>4.5</td>
<td>-</td>
</tr>
<tr>
<td>1967</td>
<td>-0.2</td>
<td>5.0</td>
<td>3.8</td>
<td>4.2</td>
<td>3.4</td>
<td>5.3</td>
</tr>
<tr>
<td>1968</td>
<td>11.4</td>
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<td>2.7</td>
<td>7.8</td>
<td>5.2</td>
<td>8.9</td>
</tr>
<tr>
<td>1969</td>
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<td>9.5</td>
<td>8.2</td>
<td>9.3</td>
<td>4.1</td>
<td>9.2</td>
</tr>
<tr>
<td>1970</td>
<td>12.1</td>
<td>14.6</td>
<td>15.6</td>
<td>9.8</td>
<td>11.6</td>
<td>13.9</td>
</tr>
<tr>
<td>1971</td>
<td>10.1</td>
<td>12.0</td>
<td>21.7</td>
<td>17.4</td>
<td>13.0</td>
<td>5.6</td>
</tr>
<tr>
<td>1972</td>
<td>12.2</td>
<td>12.8</td>
<td>15.7</td>
<td>10.9</td>
<td>20.7</td>
<td>18.4</td>
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<tr>
<td>1973</td>
<td>8.9</td>
<td>11.9</td>
<td>13.8</td>
<td>17.8</td>
<td>11.0</td>
<td>15.8</td>
</tr>
<tr>
<td>1974</td>
<td>35.4</td>
<td>24.6</td>
<td>16.7</td>
<td>20.7</td>
<td>37.2</td>
<td>17.5</td>
</tr>
<tr>
<td>1975</td>
<td>24.9</td>
<td>30.4</td>
<td>26.9</td>
<td>28.2</td>
<td>32.6</td>
<td>20.8</td>
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<tr>
<td>1976</td>
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<td>11.1</td>
<td>15.2</td>
<td>9.9</td>
<td>10.2</td>
<td>20.4</td>
</tr>
<tr>
<td>1977</td>
<td>7.9</td>
<td>8.1</td>
<td>5.8</td>
<td>8.5</td>
<td>7.1</td>
<td>6.1</td>
</tr>
<tr>
<td>1978</td>
<td>14.7</td>
<td>22.4</td>
<td>23.2</td>
<td>12.7</td>
<td>23.8</td>
<td>16.2</td>
</tr>
<tr>
<td>1979</td>
<td>14.9</td>
<td>10.4</td>
<td>20.6</td>
<td>14.7</td>
<td>14.5</td>
<td>12.2</td>
</tr>
<tr>
<td>1980</td>
<td>20.8</td>
<td>27.1</td>
<td>19.3</td>
<td>25.3</td>
<td>13.8</td>
<td>13.4</td>
</tr>
</tbody>
</table>

1 aged 21 or over.

Source: Department of Employment Gazette, 1964-80 (October earnings inquiry).
### Table 8.8  
Annual Increases in Average Weekly Earnings of Full-Time Manual Men: 1 Railways and Private Sector Compared, 1964-80

<table>
<thead>
<tr>
<th>Year</th>
<th>Railways</th>
<th>Shipbuilding 2</th>
<th>Vehicle Manuf.</th>
<th>Manuf. Inds.</th>
<th>All Inds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>8.2</td>
<td>10.5</td>
<td>3.6</td>
<td>8.0</td>
<td>8.1</td>
</tr>
<tr>
<td>1965</td>
<td>11.1</td>
<td>10.9</td>
<td>5.8</td>
<td>8.0</td>
<td>8.2</td>
</tr>
<tr>
<td>1966</td>
<td>12.9</td>
<td>8.3</td>
<td>-5.7</td>
<td>3.1</td>
<td>3.6</td>
</tr>
<tr>
<td>1967</td>
<td>-0.2</td>
<td>2.1</td>
<td>15.2</td>
<td>5.3</td>
<td>5.3</td>
</tr>
<tr>
<td>1968</td>
<td>11.4</td>
<td>10.5</td>
<td>9.2</td>
<td>7.9</td>
<td>7.6</td>
</tr>
<tr>
<td>1969</td>
<td>9.4</td>
<td>8.9</td>
<td>8.2</td>
<td>8.1</td>
<td>8.0</td>
</tr>
<tr>
<td>1970</td>
<td>12.1</td>
<td>12.1</td>
<td>12.7</td>
<td>13.2</td>
<td>13.0</td>
</tr>
<tr>
<td>1971</td>
<td>10.1</td>
<td>12.1</td>
<td>10.2</td>
<td>8.5</td>
<td>10.3</td>
</tr>
<tr>
<td>1972</td>
<td>12.2</td>
<td>5.7</td>
<td>18.3</td>
<td>15.4</td>
<td>15.8</td>
</tr>
<tr>
<td>1973</td>
<td>8.9</td>
<td>14.4</td>
<td>8.8</td>
<td>14.7</td>
<td>14.2</td>
</tr>
<tr>
<td>1974</td>
<td>35.4</td>
<td>20.8</td>
<td>13.3</td>
<td>18.3</td>
<td>18.9</td>
</tr>
<tr>
<td>1975</td>
<td>24.9</td>
<td>33.9</td>
<td>17.0</td>
<td>21.6</td>
<td>22.5</td>
</tr>
<tr>
<td>1976</td>
<td>5.8</td>
<td>6.3</td>
<td>17.8</td>
<td>13.5</td>
<td>12.4</td>
</tr>
<tr>
<td>1977</td>
<td>7.9</td>
<td>6.7</td>
<td>3.4</td>
<td>8.5</td>
<td>8.8</td>
</tr>
<tr>
<td>1978</td>
<td>14.7</td>
<td>15.7</td>
<td>11.8</td>
<td>15.2</td>
<td>14.6</td>
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<tr>
<td>1979</td>
<td>14.9</td>
<td>7.9</td>
<td>13.0</td>
<td>15.9</td>
<td>16.1</td>
</tr>
<tr>
<td>1980</td>
<td>20.8</td>
<td>14.3</td>
<td>8.1</td>
<td>13.6</td>
<td>16.6</td>
</tr>
</tbody>
</table>

1 aged 21 or over.  
2 privately-owned for most of the period under consideration.

Source: Department of Employment Gazette, 1964-80 (October earnings inquiry).
industries and all industries included in the D.E. survey. Both sets of data serve as approximate yardsticks of the effectiveness of organised labour at B.R. in maintaining the relative earnings position of their members.

The first of these tables suggests that, in the 1960's (with the exception of 1967), the rate of increase in earnings of B.R.'s manual workers was consistently higher than those of the other nationalised industries in table 8.7. However, the pattern changed in the 1970's, in which the rate of increase in earnings of manual workers in all of these industries tended to outstrip that of railways until the end of that decade. This was true for all of these industries in 1973 and 1976, and most of them in 1971, 1975 and 1978. This was particularly so in the case of the coal industry. This industry was highlighted above as one which experienced high levels of industrial unrest and, ceteris paribus, it might be expected that organised labour in that industry would have achieved above average increases in earnings. Indeed, the rate of increase in earnings of manual workers in this industry in 1974 even exceeded the exceptional 35.4 percent increase at B.R. in that year. However, in 1980, the rate of increase in earnings of railway manual workers (at 20.8 percent) achieved a differential (at 7 percent) over the rate of increase in earnings of similar workers in the coal industry. This was comparable to those achieved in the 1960's.

Furthermore, table 8.8, which sets out the rate of increase in earnings of manual workers in private sector industries, reveals a similar pattern of results. Thus, in the 1960's, manual workers
in the railways had higher rates of increase in earnings than those in shipbuilding, motor vehicle manufacture and, indeed, than the averages for manufacturing industry and all industries in the D.E. survey, with the exception of 1967. Similarly, in the 1970's the rates of increase in earnings of railway manual workers failed to keep pace with the others until the end of this decade. One particular, notable exception to this was its 35.4 percent increase in 1974. Therefore, this evidence suggests that the strength of organised labour at B.R. was largely confined to a particular period, the 1960's, and the deterioration of its members actual earnings is indicative of a weakening of their position.

However, while these rates of increase in earnings afford a measure of the strength of organised labour, it is somewhat crude. This is particularly because actual activity levels at a given organisation are liable to differ from those anticipated. Thus differences in actual earnings from those expected can arise, particularly where there are payment by results schemes and where overtime has to be worked to compensate for shortages in labour. It might be argued, therefore, that the crucial rate of increase which reflects the strength of organised labour is the \textit{ex ante} one, i.e. the negotiated increase in the pay round.

The N.E.D.O. (1977, \textit{op.cit.}) study gathered evidence on this for a limited number of nationalised industries. This reveals a different pattern from that of the D.E. earnings surveys. Thus, in the period 1961-65, rail workers had negotiated increases in wages
which were higher than those of coal, steel and electricity; in 1966-70, the rail workers had negotiated increases which were only higher than those of gas workers, particularly because of low rates at the end of this period; and, finally, in 1971-75, B.R. outstripped even the coal industry workers in a period of high negotiated increases to rates of pay (see table 8.9).

Furthermore, another indication of the strength of organised labour is the extent to which it can maintain or increase its share of a given organisation's running costs. This overcomes a potential distortion in examining the strength of organised labour by focussing on pay relativities. That is, workers in a declining industry might not be able to maintain their position relative to other workers, but they might do so at the expense of other aspects of the organisation, for example, by claiming higher wages and thereby diminishing amounts set aside for retention on capital improvements in the business. Indeed, as figure 8.2 shows, organised labour successfully maintained (and frequently exceeded) their share of railway operating expenditure at 60 percent throughout 1963 to 1980. Also, it is instructive to note that the return to labour was maintained at this level, despite its increasing share of operating revenues necessary to finance it. Thus, as can be seen from figure 8.2, in the 1960's, threequarters of B.R.'s revenue (excluding grants and subsidies) went on labour costs. This dipped to 67.9 percent and 69.1 percent in 1970 and 1971, respectively, but has subsequently tended to claim virtually the entire railway operating revenues and actually exceeded them in 1975. This would underline the B.R. view that its level of labour costs is
Table 8.9  Negotiated Pay Increases in Certain Nationalised Industries, 1961-75

<table>
<thead>
<tr>
<th>Year</th>
<th>Rail</th>
<th>Coal</th>
<th>Gas</th>
<th>Electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>-</td>
<td>7.5</td>
<td>6.1</td>
<td>5.8</td>
</tr>
<tr>
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<td>6.0</td>
<td>4.5</td>
<td>5.6</td>
<td>4.5</td>
</tr>
<tr>
<td>1964</td>
<td>8.8</td>
<td>4.5</td>
<td>6.8</td>
<td>4.3</td>
</tr>
<tr>
<td>1965</td>
<td>3.3</td>
<td>7.4</td>
<td>6.6</td>
<td>9.8</td>
</tr>
<tr>
<td>1966</td>
<td>-</td>
<td>5.2</td>
<td>4.5</td>
<td>4.1</td>
</tr>
<tr>
<td>1967</td>
<td>3.7</td>
<td>5.1</td>
<td>5.1</td>
<td>4.5</td>
</tr>
<tr>
<td>1968</td>
<td>12.0</td>
<td>5.7</td>
<td>4.7</td>
<td>9.6</td>
</tr>
<tr>
<td>1969</td>
<td>5.4</td>
<td>10.1</td>
<td>4.5</td>
<td>10.1</td>
</tr>
<tr>
<td>1970</td>
<td>8.0</td>
<td>20.0</td>
<td>15.6</td>
<td>13.1</td>
</tr>
</tbody>
</table>

Annual averages:
- 1961-65: 5.95% (Rail), 4.4% (Coal), 5.63% (Gas), 4.83% (Electricity)
- 1966-70: 7.89% (Rail), 10.9% (Coal), 6.59% (Gas), 9.62% (Electricity)
- 1971-75: 25.59% (Rail), 25.56% (Coal), 22.08% (Gas), 21.64% (Electricity)

* computed as annual equivalent percentage increases.

Source: Compiled from N.E.D.O. (1977), Manpower and Pay Trends (op.cit.), p.38.
Figure 8.2  Labour costs as a proportion of total railway expenditure and railway revenues.

1963 { 62.6% 75.8%  
1964 { 63.8% 75.5%  
1965 { 63.9% 76.2%  
1966 { 64.8% 77.3%  
1967 { 63.8% 77.7%  
1968 { 61.7% 76.0%  
1969 { 62.6% 77.1%  
1970 { 63.6% 79.9%  
1971 { 62.7% 69.1%  
1972 { 66.9% 74.2%  
1973 { 66.4% 80.0%  
1974 { 65.2% 76.8%  
1975 { 66.8% 77.4%  
1976 { 66.7% 100.7%  
1977 { 66.7% 92.2%  
1978 { 61.0% 93.4%  
1979 { 60.9% 85.9%  
1980 { 59.8% 87.0%  

Where: Railway revenues
Railway expenditure

unduly high and might be taken as at least presumptive evidence of the strength of organised labour on the railways.

A further aspect of this is B.R.'s viewpoint that increases in labour costs are unrelated to productivity. If this is measured, in the first instance, in terms of changes in number employed, it can be shown that this viewpoint is substantiated. This can be assessed from table 8.10, which compares increases in labour costs throughout this period with corresponding reductions in the railway labour force. This table provides a measure of the extent to which a given year's increase in labour costs has been financed by cost savings arising from 'productivity', defined as reductions in numbers employed. The valuation of cost savings arising from the reduction of numbers employed is made at the average wage rate in the year in which the reduction is made. It is evident from this table that increases in railway labour costs in the 1960's were well covered by the cost savings arising from the reductions in the previous year's labour force. However, in the 1970's, as the rate of reduction in the railway labour force tails off and the rate of increase in total labour costs gains momentum, the contributions to increased labour costs from reductions in the previous year's labour force have been negligible.

Furthermore, when labour costs are compared to other productivity measures (see figure 8.1), it is evident that there is indeed no relationship between the two. Thus, in 1975, the year in which railway labour costs exceeded all its operating revenues (see figure 8.2),
<table>
<thead>
<tr>
<th>Year</th>
<th>Increase in Railway Labour Costs (£m.)</th>
<th>Reduction from Previous Year's Labour Force (£m.)</th>
<th>N of Times/Proportion of (1) Financed by (2)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>1</td>
<td>40,546</td>
<td>31.8</td>
</tr>
<tr>
<td>1965</td>
<td>3.2</td>
<td>33,962</td>
<td>9.2</td>
</tr>
<tr>
<td>1966</td>
<td>2.8</td>
<td>26,092</td>
<td>8.9</td>
</tr>
<tr>
<td>1967</td>
<td>(9.5)</td>
<td>20,859</td>
<td>-</td>
</tr>
<tr>
<td>1968</td>
<td>(1.7)</td>
<td>21,818</td>
<td>-</td>
</tr>
<tr>
<td>1969</td>
<td>(32.3)</td>
<td>42,659</td>
<td>-</td>
</tr>
<tr>
<td>1970</td>
<td>30.6</td>
<td>40,379</td>
<td>1.6</td>
</tr>
<tr>
<td>1971</td>
<td>20.7</td>
<td>11,562</td>
<td>.89</td>
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<tr>
<td>1972</td>
<td>57.5</td>
<td>5,039</td>
<td>.16</td>
</tr>
<tr>
<td>1973</td>
<td>39.2</td>
<td>5,761</td>
<td>.31</td>
</tr>
<tr>
<td>1974</td>
<td>119.8</td>
<td>(4,017)</td>
<td>-</td>
</tr>
<tr>
<td>1975</td>
<td>191.0</td>
<td>4,960</td>
<td>.08</td>
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<tr>
<td>1976</td>
<td>70.9</td>
<td>7,236</td>
<td>.41</td>
</tr>
<tr>
<td>1977</td>
<td>56.3</td>
<td>406</td>
<td>.03</td>
</tr>
<tr>
<td>1978</td>
<td>103.5</td>
<td>91</td>
<td>.01</td>
</tr>
<tr>
<td>1979</td>
<td>153.2</td>
<td>167</td>
<td>.01</td>
</tr>
<tr>
<td>1980</td>
<td>194.8</td>
<td>3,972</td>
<td>12.9</td>
</tr>
</tbody>
</table>

* The reduction of the previous year's labour force times the average annual wage of that year as a proportion of the current year's paybill.

productivity was actually falling (see figure 8.1). Furthermore, the proportion of total operating expenses devoted to labour costs in 1972 and 1973 were virtually identical (79.2 percent and 80.0 percent, respectively - see figure 8.2), but the first of these years was characterised by a fall in output, while there was a substantial increase in output in 1973. In fact, while B.R. only reported adversely upon the relationship between the level of labour costs and productivity in 1965 and 1968, the 1970's point up such divergences to a far greater degree. Indeed, the increases in labour costs in the 1960's were accompanied by significant reductions in labour and increases in output.

3. CONCLUSION

This chapter examined industrial relations at B.R. This is a highly contentious aspect of B.R.'s operations. As such, the findings of this chapter have wider potential implications than their primary purpose, viz., the determination of whether they do or do not contribute to business risk at B.R. The extent to which (a) the evidence presented in this chapter supports the viewpoint that B.R. is exposed to business risk and (b) such findings might be of wider benefit to policy makers, are considered below. First of all, the main findings of this chapter are set out.

Two main issues were uncovered in this examination of B.R.'s industrial relations: 1, industrial unrest and 2, labour productivity. The evidence on industrial unrest embraces two types of dispute - internal and external. As regards official internal disputes, their frequency and financial impact in the period studied (1963-80) were slight. However, B.R. was particularly vulnerable to external disputes in the period studied. As noted in Chapter 7, B.R. is heavily reliant upon a limited number of
customers for its freight business. Furthermore, the very industries upon which it is so reliant have a particularly high incidence of industrial unrest.

The second aspect of this study of B.R.'s industrial relations - labour productivity - also subdivided into two, i.e. (a) B.R.'s attempts at productivity improvement and (b) the level of labour costs. Scrutiny of (a) revealed a significant failure on the part of B.R.'s management to obtain the levels of labour productivity which it had sought to achieve in the 1970's. This was seen as an indication of the strength of organised labour. The second item, level of labour costs, is related to labour productivity negotiations. It provides a further yardstick of the strength of organised labour in negotiations. This revealed that B.R. had consistently conceded significant proportions of its income to organised labour, despite its failure to secure significant labour productivity increases since the early 1960's.

Overall, therefore, the impact of B.R.'s industrial relations is of great significance. It constitutes an important element in B.R.'s exposure to business risk. Its influence on B.R.'s reported financial results extends to both operating costs and revenues. Thus, there is uneven progress in controlling labour costs, particularly because of failures in productivity negotiations. There is also an erratic loss of earnings from industrial disputes. Furthermore, these findings are of some wider significance to policy-makers. In particular, the failure of management to secure its own planned productivity improvements might be viewed as a matter of concern. One approach to this problem would be greater, and more detailed, intervention in B.R.'s industrial relations by Government. However, as discussed in Chapter 6, this policy is fraught with difficulties. An alternative reaction to these findings, which is consistent with the nature of B.R. as a commercial organisation, would be that of making changes in top management at B.R.
Chapter 9

A QUALITATIVE ASSESSMENT: (C) RELATIONSHIPS WITH GOVERNMENT

As stated in chapter 1 of this thesis, there are two particular aspects of B.R.'s relations with Government which were consistently commented upon in its Annual Reports from 1963 to 1980 and which might constitute risk factors, namely,

1. pricing policies and,
2. investment policies.

Both of these factors could evidently influence B.R.'s reported financial results. Of the two, Government intervention in B.R.'s pricing policies would have the most immediate effect on its profit and loss account. However, the influence of intervention on investment policies might also have a marked effect on reported financial results. This type of intervention might result in, for example, the delay of essential renewals, or the failure to maintain standards of timeliness and comfort because of equipment which is in use well beyond its economic life. To the extent that such interventions are uneven, their impact on consumer (dis)satisfaction is likely to result in an erratic pattern of revenues in competitive markets.

However, in chapter 5 (the 'Social Profit' Alternative), it was shown that intervention of this nature might be accommodated.
within existing means of financial reporting, so long as it is made explicit. There are three landmarks in the handling of such intervention which suggest this: first, the requirement of the 1961 White Paper on the nationalised industries that any such intervention by a Minister of State responsible for a state industry should be made a matter of public record (H.M. Treasury, 1961, para 31, p.10); secondly, the 1967 White Paper went further by requiring compensation to be paid for any such intervention (H.M. Treasury, 1967, para 37, p.14); and, finally, the 1978 White Paper which required Ministers of State to set out not only whether intervention took place or not (plus the amount of compensation), but also the basis of computing such compensation and its rationale (H.M. Treasury, 1978, para 21, p.11).

Therefore, as the effects of such intervention should be reflected in its Annual Report and Accounts, it might be argued that the intervention experienced by B.R. on its pricing and investment policies is not a risk factor and need not be regarded as such. However, to the extent that such intervention is erratic and informal (and, therefore, never made explicit and compensated) any nationalised industry exposed to such interference might be seen as facing a risk factor which does affect the variability of its profits. Indeed, throughout the period under study there should be little or no evidence of informal pressures on pricing and investment policies which were not reported upon and publicly acknowledged by the responsible Minister of State, or for which compensation was not paid,
but the opposite is true. In practice, it is shown below that informal intervention has taken place, regardless of the requirements of these White Papers. However, there is also evidence that this pressure is uneven and unpredictable. Therefore, to the extent that such activities are inherent in Government: nationalised industry relationships, it might be argued that this does indeed constitute a risk factor. Thus, in the following examination of Government intervention in B.R.'s pricing and investment policies, special reference is made to the incidence of informal pressures exerted by Ministers.

1. PRICING POLICIES

The impact of Government intervention on B.R.'s pricing policies is examined in two stages:

(i) The nature of government intervention: B.R.'s claims,

(i) The nature of government intervention: B.R.'s claims

Within this section, the actual instances of intervention, and the different forms which this took, are set out, first of all. After this, the nature of such Government intervention is considered.
(a) The instances of intervention

Scrutiny of B.R.'s Annual Reports revealed three repeated concerns in nine of the 18 years under study:

(1) The lag between increases in costs and the approval of price increases\(^1\)

(2) The quantity of authorised price increases relative to the cost increases incurred\(^2\)

(3) The cumulative effect of having increases in costs and revenues continually 'out of step'\(^3\)

Category (1) above involved delays which ranged from three months (1974) to a year (1968) and included one delay of at least six months (1967). In assessing these comments as elements of a 'risk factor', it appears that these delays were arising as a results of the policies of the Government of the day: it might therefore be assumed that the railways suffered no more or less than other industries. However, the pervasive influence of transport costs could obviously have prompted the Government to be more severe towards railways than other industries, and this possibility is examined below.

The second category of comments on Government influence over pricing policies, the actual amounts of price increases authorised, has apparently not been a pressing concern for the railways during this period. The scrutiny of its Annual Reports reveals that only

\(^1\) B.R. - 1966, p.1, Ch.1; 1967, p.1, Ch.1; 1968, p.17, Ch.IV; and 1974, p.4.

\(^2\) B.R. - 1971, p.2, Ch.1; 1974, p.3.

\(^3\) B.R. - 1967, p.1, Ch.1; 1971, p.2, Ch.1; 1972, p.2; 1973, p.3; 1974, p.3; 1975, p.12; 1976, p.18.
two references were made to this aspect of Government intervention in pricing policies. However, the second of these comments, i.e.,

"... in 1972, costs rose by 10%: we were allowed to increase prices by 8%. In 1973, costs rose by 6%: we were allowed to increase prices by 3%...."

(B.R., 1974, p.3),

highlights the impact of not allowing the railways a sufficient increase to cover its costs. This is particularly so when it is considered that there were deficits on profit and loss account in 1971, 1972 and 1973.

This leads to consideration of the third theme, which was of most concern to British Rail during this period, based on the frequency of the references made to it. This concern was the cumulative effect of Government intervention on the railways' ability to match its costs and revenues. Price increases are based on the existing price level and where the proportionate increase to price is either too great, for the market to bear (1974), or to come within the confines of Government pricing policies (1971, 1972 and 1973), or to be approved by the Minister (1967), the shortfall in revenue is felt the year the price increase is sought and it further affects the 'pricing base' for the following year (1975 and 1976). The matching of costs and revenues is therefore most difficult to achieve, as cost increases 'lead' and revenue increases 'lag'. Thus British Rail might not cover full accounting costs, unless a substantial increase in fares and charges is allowed when (tacit or explicit) prices (and incomes) policies lapse. This problem is first mentioned
during the prices and incomes policies of the mid-1960's, but British Rail continued to emphasise the difficulties thus created through the 1970's. This is the issue, as perceived by British Rail, in adjusting to Government intervention in pricing policy.

(b) The nature of government intervention

As for the nature of such intervention, on the face of it, these instances of Government interference on pricing are informal and might therefore be classified as 'risk factors'. Thus, in the period 1961-66, there was neither an adjustment of B.R.'s financial target (i.e. breaking even on revenue account), nor a public acknowledgement of Ministerial intervention. Also, in the period 1967 to 1977, there is only one instance of Government compensation being paid as a result of interference in B.R.'s pricing policies. This was the payment of £27 million to B.R. in 1972. However, not only was this in response to B.R.'s compliance with a C.B.I. policy (the '1971 Initiative') on pricing with which B.R. had to comply (at the behest of Government), but B.R. also considered it to be both inadequate as an outright sum and because it meant that increases in costs and revenues were seriously out of step in subsequent periods.

Finally, as regards the post-1978 period, there have been no suggestions of Government intervention on pricing policies in B.R. Annual Reports, whether of an explicit or implicit nature. Indeed, in the 1978 White Paper (H.M. Treasury, 1978, para 54, p.22) the suggestion was made that there should be no such intervention in
the pricing policies of any nationalised industry, because it was considered to be counter-productive in terms of the efficient allocation of resources. However, this period (in effect mainly 1979-80, as the 1978 White Paper was not published until March, 1978) is rather a short one over which to judge whether the policy of non-interference can be expected to continue indefinitely.

Therefore, on the whole, Government interference in B.R.'s pricing policies does appear to have been informal, or at least, to the extent that such interference was made explicit, B.R.'s reported financial results have not been adequately revised in the manner suggested in chapter 5.

(ii) The nature of government intervention: an assessment of B.R.'s claims

The strength of the case made by B.R. is assessed (and corroborated by) the evidence gathered in the studies by Millward (1976) and N.E.D.O. (1977). Both of these studies are considered, in turn, below.

(a) Millward's study

Millward examined the possibility that the public corporations experienced greater pressure than private sector organisations under Government anti-inflation policy in the period 1949 to 1973. He adopted the combined approach of (1) examining official policy statements, the machinery of policy implementation
and the use of informal pressure and (2) analysing data on the pricing and profitability of manufacturing industries and the nationalised industries. He discovered that the nationalised industries experienced a greater degree of interference than private sector industries. Also, another factor of particular pertinence to the present discussion, is the weight of his analysis, which suggests that unofficial intervention on pricing policies was the principal means by which the Government influenced the nationalised industries. Indeed, B.R. was found to be particularly susceptible to this.

(1) Policy implementation

Thus, the first part of Millward's study provides evidence that whereas there were several instances of potential discrimination against the nationalised industries, there was only one such instance within the field of official policy, viz., the Price Codes implemented from 1973 to 1974. These Codes restricted price increases to amounts which reflected 'allowable' cost increases for certain costs, primarily raw materials, interest charges and approved pay increases. Certain qualifying provisions were included in these Codes for loss-making firms, in which the Price Commission could waive all the Code provisions on prices and profits for firms in deficit or threatened with deficit. The nationalised industries were, however, excluded from these provisions (Millward, op.cit., p.229).
In addition to this isolated instance of official discrimination, Millward details a series of further potential sources of discrimination within the machinery for implementation of anti-inflation policy. Firstly, the form of the machinery for authorising price increases up to 1970. Nationalised industries had to give notice of intended price changes three months in advance, compared to the one month of large private manufacturing firms. Advance warnings of such price increases by public corporations had to be made to the Minister. The Select Committee of the Nationalised Industries (S.C.N.I.) saw this as a formalising of the procedure for monitoring price increases, making for potentially closer scrutiny relative to private sector price increases. They also observed that this led, in practice, to more detailed control in at least one nationalised industry - British Rail (S.C.N.I., 1968, p.87).

Also, delays occurred in allowing nationalised industry price increases simply because of the number of parties to be consulted relative to the private sector, i.e. the Minister, a Consultative Committee or Consumers' Council and the National Board for Prices and Incomes (N.B.P.I.). The Government had announced (in September 1967) that major price increases by nationalised industries had to be referred to the N.B.P.I., which was empowered to carry out an efficiency audit to determine whether any proposed increases were justified. The S.C.N.I. considered this to be discrimination against nationalised industries, since only selected private sector increases were to be examined.
Furthermore, the C.B.I. Initiative on prices in July, 1971 had a different impact on private and public corporations. The nationalised industries were asked to comply with this Initiative. However, the C.B.I. had no sanctions and in excess of 200 firms to monitor, whereas Ministers had direct access to state corporations and these were only a limited number to monitor.

Finally, on the subject of informal pressures being exerted on the pricing policies of nationalised industries, Millward presents evidence which shows that such pressures were exerted on their prices from 1965 on to the 1970's by Ministers. This accords with the stated view of the chairman of the N.B.P.I. to the effect that nationalised industries were regarded as being of fundamental importance to the economy by Governments, which had therefore "dragged their feet" in approving price increases (Jones, 1973, pp.95-97).

(2) A quantitative analysis

The second part of Millward's work, his analysis of quantitative data, suggests that the above-mentioned potential for greater intervention in the pricing policies of state industries was indeed exercised. In the years 1965, 1966 and 1967, his evidence on rates of profitability suggests that prices restraint "bit more effectively" on public corporations than on manufacturing (op.cit., p.241). Also, after 1969, there is a "highly suggestive" (op.cit., p.241) association between the decline in the public corporation rate of profit and the existence of a more effective machinery to monitor price increases in
public corporations than the private sector: namely, the
discriminatory elements in the Prices Codes of the 1970's, the
strong back-up to the C.B.I. Initiative and informal Government
presures.

(b) The N.E.D.O. study

This analysis by Millward is supported by the findings
of a study by the N.E.D.O. (1977). This report concluded that
price restraint, as exercised by the Government, was the major
determinant of nationalised industries pricing policies in the period
1960 to 1975. Government policies had kept down price increases
in almost all the state industries examined by N.E.D.O. (namely, gas,
rail, steel, electricity, coal and the post office), although to
differing degrees.

The N.E.D.O. report also suggested that informal pressures on
the pricing policies of the nationalised industries had been strong.
Thus it stated that these industries,

"have been requested to keep down prices when there has
not been any official policy and they have been subject
to more stringent prices control than the private sector"

(N.E.D.O., op.cit., p.21)

The exact nature of the price restraint which N.E.D.O.
discovered in its investigation of the abovementioned nationalised
industries is shown in tables 9.1(a) and 9.1(b). Specifically
regarding British Rail, the N.E.D.O. report discovered that its
### Table 9.1(a) Prices Restraint at British Gas and British Rail

<table>
<thead>
<tr>
<th>Industry</th>
<th>Period</th>
<th>Nature of specific intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td>1965/66</td>
<td>Proposed increase deferred for 3 months on National Board of Prices and Incomes (N.B.P.I.) recommendations.</td>
</tr>
<tr>
<td></td>
<td>1966/67</td>
<td>General price restraint and price freeze meant industry could not increase prices.</td>
</tr>
<tr>
<td></td>
<td>1967/68</td>
<td>Gas Boards were not allowed to implement a surcharge on tariffs initially and the case was referred to N.B.P.I. who eventually granted an increase in unit revenue after a substantial loss had been incurred.</td>
</tr>
<tr>
<td></td>
<td>1969/70 and 1970/71</td>
<td>A tariff increase was delayed for a year pending an inquiry by the National Board for Prices and Incomes.</td>
</tr>
<tr>
<td></td>
<td>1971/72</td>
<td>C.B.I. initiative required that the Gas Council was forced to pare down a 7½% proposed price increase to 5%. The restraint was used to defer the implementation of the increase for six months. No changes in the structure of domestic tariffs were allowed.</td>
</tr>
<tr>
<td></td>
<td>1972/73</td>
<td>Gas prices were frozen because of general restraint imposed in Autumn 1972 by the government's counter inflation programme.</td>
</tr>
<tr>
<td></td>
<td>1973/74</td>
<td>Gas Corporation not allowed to increase prices to domestic consumers until January 1974. No changes in the structure of domestic tariffs were allowed.</td>
</tr>
<tr>
<td>British Rail</td>
<td>1966</td>
<td>Increase not allowed under period of severe price restraint seriously affected the Board's finances. A price increase approved by the Transport Tribunal had still not been implemented by the end of 1967 because the N.P.B.I. had not reported.</td>
</tr>
<tr>
<td></td>
<td>1967</td>
<td>A general increase in ordinary fares and season ticket rates was rejected.</td>
</tr>
<tr>
<td></td>
<td>1971/72</td>
<td>Because of C.B.I. initiative prices were restrained.</td>
</tr>
<tr>
<td></td>
<td>1971-73</td>
<td>Because of counter inflation policy only small price increases were allowed that were inadequate to cover cost increases.</td>
</tr>
<tr>
<td></td>
<td>1973</td>
<td>Restriction of freight and parcels price increase below application.</td>
</tr>
<tr>
<td></td>
<td>1974</td>
<td>2 month delay in getting the Price Commission to accept a price rise.</td>
</tr>
</tbody>
</table>

Source: N.E.D.O. (op.cit.), p.17.
<table>
<thead>
<tr>
<th>Industry</th>
<th>Period</th>
<th>Nature of specific intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>1969</td>
<td>December 1968 price increases were sought but they were referred to N.B.P.I. and not implemented until June 1969 and not in full until November 1969.</td>
</tr>
<tr>
<td></td>
<td>1970</td>
<td>Government delayed a requested price increase for 3 months.</td>
</tr>
<tr>
<td></td>
<td>1971</td>
<td>Price increase averaging 14% was proposed but the government advised the B.S.C. to restrict the increase to half the amount.</td>
</tr>
<tr>
<td></td>
<td>1971/72</td>
<td>Under the C.B.I. initiative the Corporation was only allowed to increase prices by 4.6% and the increase was deferred until April 1972.</td>
</tr>
<tr>
<td></td>
<td>1973</td>
<td>Since January 1973 price restraints on Treaty of Paris products (two thirds of output) have been removed.</td>
</tr>
<tr>
<td>Electricity</td>
<td>1965/66</td>
<td>N.B.P.I. deferred a London Electricity Board price increase for a short time.</td>
</tr>
<tr>
<td></td>
<td>1967/68</td>
<td>N.B.P.I. recommended that C.E.G.B. Bulk Supply Tariff be fixed at a lower level than that sought by the Electricity Board.</td>
</tr>
<tr>
<td></td>
<td>1970/71</td>
<td>Direct government action to hold prices down but not within any overall policy.</td>
</tr>
<tr>
<td></td>
<td>1971/72</td>
<td>C.B.I. initiative and Electricity Boards only allowed to increase price by 5%.</td>
</tr>
<tr>
<td></td>
<td>Nov 1971</td>
<td>Counter Inflation Act ) Increases under price restraint</td>
</tr>
<tr>
<td></td>
<td>1973</td>
<td>Counter Inflation Act ) less than desired</td>
</tr>
<tr>
<td></td>
<td>Feb 1975</td>
<td>Increases allowed were slightly below those sought by the Electricity Council.</td>
</tr>
<tr>
<td>Coal</td>
<td></td>
<td>No real evidence of price restraint.</td>
</tr>
<tr>
<td>Post Office</td>
<td>1968/69</td>
<td>A small loss of revenue was incurred because of a delay, caused by referral to the N.B.P.I., in a price increase.</td>
</tr>
<tr>
<td></td>
<td>1970/71</td>
<td>Price increases not allowed in full.</td>
</tr>
<tr>
<td></td>
<td>1971/72</td>
<td>Price rises kept down to 3% because of C.B.I. initiative.</td>
</tr>
<tr>
<td></td>
<td>1972/73</td>
<td>Post Office price rises curbed because of official restraint.</td>
</tr>
<tr>
<td></td>
<td>1973/74</td>
<td>Severe restraint under Stage II of the Counter Inflation Act.</td>
</tr>
</tbody>
</table>

prices and costs rose at much the same rate over 1963 to 1968, but from 1970 to 1975 prices rose by 64.8 percent while costs increased by 85.4 percent. This divergence of costs and revenues was primarily attributed to Government intervention. Thus the N.E.D.O. report concluded that,

"... given the competitive nature of the markets in freight and passenger transport it is likely that this market has influenced pricing decisions ..... but Government price restraint was the principal external factor (emphasis added) affecting prices over the period of analysis (i.e. 1960-75)....."

(N.E.D.O., op.cit., p.19)

Furthermore, in terms of the overall impact of Government intervention on nationalised industry prices, N.E.D.O. concluded that British Rail was one of the three such industries (the others were steel and electricity) which were affected most of all by such policies. In fact, on closer examination, it also appears that B.R. was the most vulnerable of all to such intervention. Thus, in terms of vulnerability to Government intervention, British Airways and British Steel might be excluded on the grounds that both compete primarily in international markets and are therefore mostly outwith the regulation of domestic anti-inflation policies. Similarly the Post Office might be excluded as this industry has no obvious competitors and, therefore, has the ability to recover lost revenues quickly by pricing up. This leaves the fuel and transport industries as key state corporations in Government attempts to control
inflation by price restraint in the U.K. Within these two sectors, indeed, within the state corporations as a whole, as a perusal of their comparative profitability over the period 1963 to 1975 indicates (see table 9.2), the railways and, to a lesser extent, the N.C.B. were most vulnerable to such pressures. The N.E.D.O. conclusion on the National Coal Board was "no real evidence of price restraint" (see table 9.1(b)). Thus, combined with the suggestion that the inland transport market is competitive, B.R.'s difficulties in restoring prices at levels sufficient to cover full accounting costs after price restraint would make it particularly vulnerable and, perhaps, the most vulnerable of the state corporations to Government pressure on pricing policies.

(iii) Conclusion on pricing policies

All of this evidence points to the fact that nationalised industries have been exposed to intervention in pricing policies to a greater degree than private sector corporations. Also, it appears that B.R. has been the most vulnerable of all the nationalised industries to such intervention. A particular aspect of the type of intervention practised by successive Governments has been that of the extent of the informal pressure on prices by Ministers of State, which they have not acknowledged. This prevents the incorporation of such intervention in the reported financial results of these industries, as discussed in Chapter 5 (the 'Social Profit' Alternative).

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4 c.f. Part II of this thesis on the competitive nature of the operating services. See also the section above, i.e. chapter 7, on the influence of market pressures.
Table 9.2  The Profitability(1) of Nationalised Industries, 1963-75

<table>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>British Airways</td>
<td>(3.2)</td>
<td>16.6</td>
<td>23.0</td>
<td>29.1</td>
<td>34.6</td>
<td>28.7</td>
<td>37.0</td>
<td>49.7</td>
<td>20.7</td>
<td>13.5</td>
<td>33.4</td>
<td>60.9</td>
<td>3.0</td>
</tr>
<tr>
<td>British Gas</td>
<td>31.1</td>
<td>37.8</td>
<td>46.7</td>
<td>46.7</td>
<td>46.5</td>
<td>43.7</td>
<td>40.4</td>
<td>101.7</td>
<td>108.7</td>
<td>139.9</td>
<td>151.2</td>
<td>189.3</td>
<td>161.0</td>
</tr>
<tr>
<td>British Rail (2)</td>
<td>(75.8)</td>
<td>(62.5)</td>
<td>(71.5)</td>
<td>(70.5)</td>
<td>(86.5)</td>
<td>(80.1)</td>
<td>(20.4)</td>
<td>(23.3)</td>
<td>(41.8)</td>
<td>(79.7)</td>
<td>(93.4)</td>
<td>251.2</td>
<td>-</td>
</tr>
<tr>
<td>British Steel (3)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10.4</td>
<td>7.9</td>
<td>26.3</td>
<td>28.6</td>
<td>18.1</td>
<td>53.0</td>
<td>106.7</td>
<td>158.9</td>
</tr>
<tr>
<td>Electricity (4)</td>
<td>147.00</td>
<td>186.00</td>
<td>195.00</td>
<td>237.00</td>
<td>198.00</td>
<td>257.00</td>
<td>317.00</td>
<td>304.00</td>
<td>207.00</td>
<td>254.00</td>
<td>282.00</td>
<td>166.00</td>
<td>130.00</td>
</tr>
<tr>
<td>National Coal Board (5)</td>
<td>-</td>
<td>42.7</td>
<td>43.1</td>
<td>0.5</td>
<td>27.6</td>
<td>27.8</td>
<td>15.4</td>
<td>0.4</td>
<td>25.3</td>
<td>(127.6)</td>
<td>(53.6)</td>
<td>(240.7)</td>
<td>(31.7)</td>
</tr>
<tr>
<td>Post Office</td>
<td>51.1</td>
<td>72.5</td>
<td>66.6</td>
<td>43.3</td>
<td>105.3</td>
<td>111.3</td>
<td>133.7</td>
<td>145.9</td>
<td>158.0</td>
<td>195.9</td>
<td>129.5</td>
<td>105.6</td>
<td>5.4</td>
</tr>
<tr>
<td>National Bus (6)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.3</td>
<td>(12.6)</td>
<td>(4.8)</td>
<td>(1.5)</td>
<td>(4.3)</td>
<td>(25.8)</td>
<td>-</td>
</tr>
<tr>
<td>National Freight (6)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(13.4)</td>
<td>(7.6)</td>
<td>0.4</td>
<td>1.3</td>
<td>1.7</td>
<td>(3.1)</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>


Notes:  
(1) profit before interest, excluding government grant and subsidies received.
(2) changes in the bases of accounting resulting from the 1974 re-organisation significantly affected the charges against Revenue, making them non-comparable with earlier years.
(3) established July, 1967.
(4) England and Wales only.
(5) The accounting period to 31.3.64 was for 15 months. The figure for 1964 in the table represents the 12 months to 31.3.64.
(6) established as a result of the 1968 Transport Act, but subsequently restored to private ownership.
While the most recent policy document on these industries (H.M. Treasury, 1978) proposed that such interference should no longer take place, on the basis of past form, it appears likely that there will be a recurrence of such Government intervention. Also, there is an unpredictable element associated with this interference: for example, B.R.'s protestations were made in only nine out of the 18 years under consideration. Overall, therefore, such intervention might be legitimately regarded as an element of business risk.

Finally, an important consideration is the extent to which these findings would apply to a state railway operating company. On the one hand, such pressures might be lessened if such a company was profitable (as envisaged), as B.R.'s vulnerability to Government intervention might be partly caused by concern to avoid profligacy in a continually unprofitable service. On the other hand, if Government pressures on prices are primarily caused by counter-inflation policies, as suggested above, it is likely that the state railway operating company would be at least as vulnerable to intervention as other state industries.

2. INVESTMENT POLICIES

Investment, in general, is perhaps the most important decision to be taken by management in its attempts to secure an organisation's future. Therefore, the extent to which B.R.'s consideration of
alternative, profitable, courses of action is constrained by Government intervention might be regarded as a business risk. Two aspects of such intervention in B.R.'s investment policies were revealed from a scrutiny of its Annual Reports, as follows:

(i) Execution of B.R.'s investment programme:

(a) Delays in decision-making,
(b) Changes in, and the level of, planned expenditure,

(ii) Lack of diversification

The nature of such intervention and the validity of B.R.'s claims are evaluated for each of these, in turn. This reveals that, whereas there is little support for the second of these, there is some evidence which suggests that intervention on B.R.'s investment programme might be regarded as an element of business risk.

(i) Execution of B.R.'s investment programme

(a) Delays in decision-making

The first part of this area of intervention refers to 'delays in decision-making', but this category itself naturally

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5 B.R. - 1965, p.4, Ch.I; 1968, p.6, Ch.II; 1969, p.12, Ch.II.
7 B.R. - 1969, p.6, Ch II; 1969, p.10, Ch. II; 1970, p.4, Ch.I.
subdivides into a further two components. The first of these (B.R., 1965) refers to delays in disinvestment - the implementation of the Beeching proposals. The second component refers to delays in decision-making which were brought about by Government intervention in the authorisation of its investment proposals (B.R., 1968; 1969).8 Of the two, only the first was made explicit and, therefore, capable of being incorporated within B.R.'s reported financial results in the manner discussed in chapter 5. However, this is related to a specific event (the 'Beeching cuts') in B.R.'s history which is therefore of limited significance in terms of the generality of such intervention as a risk factor.

As for the second type of delay, there is little doubt that such intervention actually took place, as B.R. claimed. Thus the S.C.N.I., in its investigation of Ministerial control of the nationalised industries, reported that the Department of Transport, when compared to the Board of Trade (now Trade and Industry) and the Ministry of Power (now Department of Energy) appeared

"... to have done the least to consider or affect total programmes as such, and to have given the closest attention to individual projects...... inevitably this has led the Ministry deep into the areas of management. The Ministry officials are now attempting to examine projects in almost as much detail, and with much the same material before them and with the same questions in mind, as the industrial managers themselves. And, indeed, the Ministry now wish to have exactly the same detailed case for projects submitted to them as is submitted to the Boards...... the degree of detailed

8 B.R. also repeated this complaint in the mid-70's. emphasising that ".... nearly 90 percent of the total value of the railway investment programme is potentially liable to be 'called in' for detailed scrutiny and Ministerial approval" (B.R. (1976), Opportunity for Change, p.69).
scrutiny applied by the Ministry of Transport to the
investment of British Rail has gone beyond the limits
that can be justified on 'specific economies',
'educative value', 'useful discipline' or any other
grounds ...."9

Nevertheless, despite B.R.'s protestations and the S.C.N.I.
findings, there was no explicit recognition by Government of any
cost imposed on B.R. by such interventions. In effect, this
influence was exerted by a form of informal pressure in much the
same way as that experienced by B.R. on its pricing policies.
However, there are a number of factors which suggest that such
interventions cannot be treated as an element of business risk.

In the first instance, this behaviour by Government might be
seen to have been justified by B.R.'s poor track record on investment.
Thus, B.R.'s investment policies of the 1950's were heavily criticised
on the grounds that the commercial viability of its investment
programmes (including its extensive Modernisation Plan of 1954) was
only superficially examined (see S.C.N.I. (1960), paras 161, 222,

Also, a further factor which might have prompted (and, indeed, justified) such detailed intervention (particularly in the
light of the criticisms of B.R.'s methods of investment appraisal)
was that of the degree to which B.R. was dependent on the Government

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9 S.C.N.I. (Ministerial Control of the Nationalised Industries, Vol.1 1968, paras 564-566). As an example of the evidence gathered by
the S.C.N.I., see Department of Transport Memorandum, 'Criteria for
Capital Investment in Railways', dated 18.9.63, which is reproduced
as Annex A, Appendix 34, S.C.N.I. (op.cit.), Vol.III.
for finance. Thus, as table 9.3 shows, for the period in which B.R. made its complaints, it was unable to generate any internal contribution to the financing of its capital expenditure, unlike most other state industries, which had substantial internal financing of their capital investment.

Therefore, both the weakness of B.R.'s techniques of appraisal and its dependence on Government finance might have justified the Government's detailed intervention in its investment policies and, thereby, undermined the case for treating such intervention as an element of business risk. However, it is important to note that this was particularly an issue of the 1960's and early 1970's.

Subsequent events have made this even less of an element of business risk. Thus, in 1974, an S.C.N.I. investigation of nationalised industry capital investment procedures reported that B.R.'s techniques of investment appraisal were soundly based and carefully evaluated in practice (S.C.N.I., First Report, Session 1973-74, para 78). Furthermore, in recent years, a scheme of authorisation of rolling programmes of investment, (rather than detailed scrutiny of individual projects) has been introduced for B.R.'s rolling stock (B.R., 1977, p.5; B.R., 1978, p.6). This leaves, of course, the possibility of detailed intervention in infrastructure investments, but this is not of immediate concern here, as it is the riskiness of a prospective state railway operating company which is being assessed.
Table 9.3  Internal Funding (1) of Investment by Public Corporations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>British Airways (2)</td>
<td>82%</td>
<td>44%</td>
<td>81%</td>
<td>69%</td>
</tr>
<tr>
<td>British Gas (2)</td>
<td>30%</td>
<td>53%</td>
<td>107%</td>
<td>55%</td>
</tr>
<tr>
<td>British Rail</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
</tr>
<tr>
<td>British Steel (3)</td>
<td>153%</td>
<td>49%</td>
<td>74%</td>
<td>66%</td>
</tr>
<tr>
<td>Electricity (4)</td>
<td>50%</td>
<td>73%</td>
<td>48%</td>
<td>54%</td>
</tr>
<tr>
<td>N.C.B.</td>
<td>71%</td>
<td>2%</td>
<td>nil</td>
<td>15%</td>
</tr>
<tr>
<td>Post Office</td>
<td>52%</td>
<td>44%</td>
<td>23%</td>
<td>37%</td>
</tr>
<tr>
<td>National Bus (5)</td>
<td>-</td>
<td>118%</td>
<td>115%</td>
<td>117%</td>
</tr>
<tr>
<td>National Freight (5)</td>
<td>-</td>
<td>21%</td>
<td>61%</td>
<td>38%</td>
</tr>
<tr>
<td>Total Nationalised Industries</td>
<td>43%</td>
<td>48%</td>
<td>33%</td>
<td>41%</td>
</tr>
<tr>
<td>All U.K. Public Corporations (6)</td>
<td>36%</td>
<td>39%</td>
<td>16%</td>
<td>30%</td>
</tr>
</tbody>
</table>


Notes: (1) 'Internal funding' is undistributed income before government subsidies, depreciation provisions, stock appreciation and transfers to reserves. It includes proceeds from disposals of fixed assets. It is expressed as a proportion of investment in fixed assets.

(2) Includes results of predecessors.
(3) Established July 1967.
(4) England and Wales only.
(5) Formed as a result of the 1968 Transport Act, subsequently transferred to private ownership.
(6) Includes passenger transport executives, statutory port authorities and non-trading corporations such as the B.B.C.
(b) Changes in, and the level of, planned expenditure

The second aspect of the execution of B.R.'s investment programme which attracted comment in its Annual Reports related to its size. This also naturally splits into two parts:

(1) The first of these concerns the frequency of changes in the size of its investment programme in the early 1970's (B.R., 1973, 1975).


It is shown below that these examples of Government intervention do indeed constitute a possible risk factor for B.R.

(1) Frequency of changes

The first of these, the frequency of changes in B.R.'s investment ceiling, was strongly criticised by B.R. in the mid-70's. Thus, the Railway Board stated that,

"over the last 3 years or so ..... investment levels have changed on average every 6 months - sometimes significantly, at other times only marginally, but every change brought further confusion and uncertainty lasting several weeks and sometimes months ...." (B.R., 1976, Opportunity for Change, p.66).

The impact of such rapid changes is a serious matter for B.R. This is particularly so because B.R.'s ability to respond is inhibited by the extent to which a given programme of investment entails a commitment beyond the initial year of the programme. Figure 9.1 shows the typical pattern of such commitments stemming from the
Figure 9.1  British Railways Board: Profile of Committed Investment Expenditure over a 5-Year Period

Source: British Rail
initial year's investment. This type of pattern limits B.R.'s ability to alter its investment programme. To counter the possibility of sudden changes in the overall level of investment, B.R. has instituted a system of priority rankings to facilitate decisions regarding which, if any, projects should be discarded in the event of any such reduction in planned expenditure. However, it seems unlikely that this procedure can totally resolve the problem, given the successive overlay of programmes with a high degree of commitment from previous years.

Nevertheless, B.R. is not the only nationalised industry with this inability to respond quickly to sudden changes in investment ceilings because of the long lead times associated with its capital investments. This is also true of the telecommunications industry (S.C.N.I. (1974), op.cit., p.3) and also appears to affect other integrated nationalised industries, such as electricity (S.C.N.I. (1974), op.cit., p.85).

Furthermore, the significance of B.R.'s experiences can be usefully assessed by examining the changes in its capital expenditure programmes with those of other nationalised industries, both at the time of B.R.'s protests and for the preceding years to provide a realistic time span over which to assess these changes. Such an examination is carried out below. This reveals that B.R.'s position is by no means unique amongst nationalised industries.
In this exercise the actual changes in capital expenditure programmes from year to year of the major nationalised industries serve as a proxy for the type of enforced changes in capital expenditure authorisation between and, indeed, within financial years, as experienced by B.R. There is no implicit assumption here of an expected stable capital investment programme from year to year in any of the organisations studied. Similarly, precise measurement of the impact of such changes on different institutions is not intended here. The major inferences to be made concern the severity of such changes as between institutions.

Given the fact of Government control over the total capital expenditure by nationalised industries, and its implications for fiscal and monetary policy, it is not surprising to see that there is a discernible pattern of changes in capital expenditure for most of these industries although some are affected more dramatically than others (see figures 9.2 to 9.9). Thus, British Airways (figure 9.2) and British Steel Corporation (figure 9.7) exhibit changes in capital expenditure which are just as frequent, but more severe, than those of British Rail; British Gas (figure 9.3) shows less frequent, but more severe changes in its capital expenditure than B.R.; N.C.B. (figure 9.8) is comparable to B.R. in its experiences; electricity supply (figure 9.4), the Post Office (figure 9.5) and National Bus (figure 9.6) have had fewer, less abrupt fluctuations in capital expenditure; finally, over a shorter period of time, N.F.C. (figure 9.9) has had as frequent, but more severe changes in capital expenditure than B.R.
CHART 9.2
% CHANGE
+90

CHARTS IN GROSS DOMESTIC FIXED CAPITAL FORMATION (G.O.F.C.F.) - BRITISH RAIL AND BRITISH AIRWAYS - 1963-75.

CHART 9.3
% CHANGE
+80

FIGURE 9.4
CHANGES IN GROSS DOMESTIC FIXED CAPITAL FORMATION (GOFcF) - BRITISH RAIL AND ELECTRICITY - 1963-75.

FIGURE 9.5
CHANGES IN GOFcF - BRITISH RAIL AND POST OFFICE - 1963-75.

FIGURE 9.6
CHANGES IN GOFcF - BRITISH RAIL AND NATIONAL BUS - 1963-75.
Figure 9.7  Changes in G O F C* - British Rail and British Steel Corporation 1964-75

Figure 9.8  Changes in G O F C* - British Rail and National Coal Board 1964-75

* at 1970 Prices.
Therefore, the susceptibility of B.R. to changes in its capital investment programme because of changes in Government policy might be seen as the lot of any nationalised industry, given their fundamental importance to the economy (and, therefore, subsequent vulnerability to changes in Government economic policy) and their reliance, to a greater or lesser degree, on the Government for finance.

However, an important feature of such intervention is the way in which it contrasts with the type discussed in chapter 5. In that earlier chapter it was shown that a state industry might be compensated for Ministerial intervention of an explicit nature (for example, a direction to purchase an asset which is not the industry's first choice) by the payment of the benefits foregone by acting against its own commercial judgement. However, the type of disruption instanced here is not amenable to this type of treatment. Indeed, no compensation payments have been made to B.R. for such intervention and this is not surprising.

In the first instance, the effect of the uncertainty attaching to investment programmes is difficult to trace directly to the profit and loss account. For example, the likely outcome of delays in essential renewals is the loss of customer goodwill in a competitive market. The incidence and timing of such losses might obviously not be readily identifiable from revenues received.

Furthermore, there is a greater risk of potential distortion associated with compensation payments for complete programmes of
investment than those for specific Ministerial interventions (for example, in a direction to purchase a particular asset). This is primarily because an instruction from a Minister to purchase a specific asset might be more effectively monitored than a given nationalised industry's total investment programme. Thus with the prospect of a general reduction in investment programmes because of Government policy, it would be in a nationalised industry's own interests to inflate its planned programme of investments beyond a level which is physically attainable in the planning period, such that any reduction in available funds might result in a manageable programme of investment. Furthermore, such reductions might be interpreted as 'intervention' which merited compensation payments.

Thus, as it appears that the impact of such wider effects of being state-owned and Government-financed cannot be precisely ascertained, they cannot be easily incorporated within reported financial results. Therefore, regardless of whether the Government accepts responsibility for such intervention or not, the exposure of nationalised industries to such experiences constitutes a genuine element of business risk.

(2) The size of investment allocations

A further aspect of the size of B.R.'s allocation of investment funds over which it has protested, is the absolute amount it has received in recent years (B.R., 1976, 1978, 1979, 1980). The
validity of treating this complaint as a 'risk factor' rests on two issues: a. the extent to which additional funds are merited and b. if so, the feasibility of incorporating the effects of the non-receipt of such funds into its reported financial results.

As regards a. above, B.R.'s arguments for additional funds relate to its desire to maintain levels of replacement investment. Thus, it has recently reported that over 98 percent of its diesel locomotives and 66 percent of its electric multiple unit vehicles had been purchased in 1963 or earlier. However, as figure 9.10 shows, this represents the tail-end of the severely criticised Modernisation Plan of the mid-50's. Indeed, this is acknowledged by B.R. in its 1978 Annual Report, in which it describes its need for replacement investment as ".... that arrears mountain thrown up by peak spending in the late 50's and early 60's" (B.R., 1978, p.6). This protest was repeated, in much the same manner, in the following year (B.R., 1979, p.7).

Therefore, given that these pressures exerted by B.R. are for the maintenance of a level of capital expenditure which is derived from this ill-conceived or, at least, poorly justified programme of investment, the case for additional funds is a dubious one.

In addition, the 'desirable/deserved/appropriate' level of investment funds for B.R. is not an objective, incontrovertible fact. The level of funding of any activity which is predominantly financed by Government must be a matter of political judgement. There are a limited amount of investment funds available from public expenditure
in a given year and, in the absence of any operational alternative (such as a cost benefit analysis of all opportunities facing the Government), political decisions must be made regarding the allocation of funds between competing claims. Given that this is so, B.R.'s protestations can be seen as the almost inevitable response of any such prospective recipient of a proportion of limited funds.

Furthermore, as regards b. above, there is no obvious way in which this type of influence might be incorporated within B.R.'s reported financial results and thereby, eliminated as a 'risk factor'. In the first instance, the measurement of this shortfall (as perceived by B.R.) appears to be intractable. The lower limit - the actual allocation of funds received - is, of course, known. However, the level of funds 'desired' by B.R. cannot realistically be treated as the upper limit in this calculation. From the central government viewpoint, the upper and lower limits will almost certainly be regarded as one and the same measure - the actual allocation. Also, even if the shortfall could be accurately measured, it could not be incorporated within B.R.'s financial results anyway, as it cannot actually be paid as compensation, assuming there is indeed a limitation on the funds available for public expenditure. Therefore, in much the same way that a private corporation might be expected to face uncertainties over the exact amount available for the financing
of its capital programme in a given year, the uncertainties attaching to the actual annual allocation received at B.R. might be seen as an element of business risk.

(ii) Lack of diversification

The second aspect of Government intervention in B.R.'s investment policies over which B.R. complained and which might be a risk factor is that of the constraints imposed on its ability to diversify into non-rail businesses. However, this form of Government intervention is of limited significance, for a number of reasons. The main focus of this thesis is on the rail business per se and, to this extent, the ability to diversify or not is irrelevant. In any event, such non-rail businesses as B.R. possesses are to be restored to private ownership. This is a proposal which B.R. itself has advocated since the mid-70's, although this was on the basis that, while private sector finance should be obtained

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10 Thus, the exact amount of funds available for a private sector enterprise's capital programme can only be predicted with certainty if it faces a stable market and it finances its capital investment entirely from internally-generated funds. To the extent that it faces fluctuations in the demand for its services or products, an element of uncertainty must attach to the exact amount available for capital investment from internally-generated funds. Furthermore, to the extent that self-financing of a capital programme is not possible, uncertainty will face any corporation over the exact amount it might raise in future periods on the capital market, in which the variability of debt and equity values is the norm.

11 Thus, the Government announced its intention to transfer B.R.'s shipping services, its hovercraft operations, its hotels and its property holdings to private ownership. (The Times, July 15, 1980, p.1.)
for non-rail businesses, it should retain overall control (B.R., 1976, p.6; B.R., 1978, p.8; B.R., 1979, p.8; B.R., 1980, p.11). Therefore, as an issue, the right to diversify investments relates to the 1960's and early 1970's. Indeed, B.R.'s protestations about its inability to diversify were restricted to the years 1968, 1969 and 1970.

Furthermore, while B.R.'s claims for a right to diversify are passé, it appears that they were also overstated for the period for which they made these claims. In the first instance, it is important to note that B.R. has never been obliged to restrict its investment to the rail business. It has always been empowered to undertake a number of activities outside passenger and freight transport, usually with the consent of the Minister. However, in the period 1962 to 1968, these non-rail activities were restricted largely to those activities which are closely related to its principal business: providing a hotel service for railway travellers, the use of a shipping service as a rail link and the management of the harbours it acquired from the British Transport Commission under the 1962 Transport Act. After the 1968 Transport Act, B.R.'s activities were widened as a result of the relaxation of restrictions on the hotel service it provided (s.50(2), Transport Act, 1968); a further provision permitted the manufacture and supply of rolling stock other than for its own consumption (s.48(2), Transport Act, 1968); B.R. was also permitted to establish a specialist consultancy business (s.50(7), Transport Act, 1968). Overall, however, despite taking advantages of such opportunities to diversify, B.R. investment is
still primarily in transport or transport-related activities. Nevertheless, an assessment of the financial returns of the different businesses comprising B.R. suggests that this restriction of opportunities for diversification did not expose B.R. to a great deal of risk.

This assessment was made by drawing on the principle of reducing risk by the diversification of trading, manufacturing and investment activities generally, as formalised by Markowitz in the 1950's. In this model, diversification is defined as the combination of investments whose returns are not perfectly or positively correlated, to reduce the overall risk of the total investments or 'portfolio'. In its general form, the Markowitz model can be represented as follows:

\[ \sigma_p = \left( \sum_{i=1}^{n} \sum_{j=1}^{n} \chi_i \chi_j r_{ij} \sigma_i \sigma_j \right)^{\frac{1}{2}} \]

where:

- \( \sigma_p \) = the standard deviation of the rate of return on the portfolio of assets,
- \( \chi_i \) = the proportion of the portfolio held in investment \( i \),
- \( \chi_j \) = the proportion of the portfolio held in investment \( j \),
- \( \sigma_i \) = the standard deviation of the rate of return on investment \( i \),
- \( \sigma_j \) = the standard deviation of the rate of return on investment \( j \),
- \( r_{ij} \) = the correlation coefficient between the rates of return on investments \( i \) and \( j \).

In the application of this model to B.R.'s businesses, the numerator in the measure of the rate of return taken was that of the operating profit. This was necessary, in the first instance, because any apportionment of central administrative and financial charges over the various businesses would have been arbitrary and could consequently have distorted the analysis. Also, the operating profit for B.R. used was that which related to total railway operations - not "profitable railway operating services", as envisaged in Part II of this thesis. This was to retain consistency with the rest of the material discussed here, which relates to total railway operations, as stated in chapter 1. As for the denominator, the capital base employed was that of fixed assets. This measure might inflate or deflate the capital base, unless opening and closing net current assets are equal in every accounting period. However, a measure of net current assets was not available for all of the non-rail businesses, therefore, the fixed asset measure was used as the denominator for the sake of consistency. This analysis was also split into two periods - 1963 to 1968 and 1969 to 1975 - to reflect the fact that differences had taken place, not only in the style of operation of existing non-rail businesses and in their range, but also in the fixed asset measure reported upon by B.R. because of the financial reconstruction contained in the 1968 Transport Act.

13 This was the measure reported upon within the annual accounts, as advocated by best commercial practice at that time, i.e. for the period in question, the written down value on a historic cost basis of measurement.
The results of this analysis are shown in table 9.4. A priori, it might be expected that the returns of all transport-related activities might be perfectly correlated, given their restriction to a particular sector of the economy. However, these results reveal no activities which are perfectly correlated and several which have negative correlations. The positive correlations are small in the period 1963 to 1968, with five high positive correlations in the period 1969 to 1975 (R.S., R.HA, R.HOV, S.HA, and P.HOV). In part A of this table, it is shown that the variability of the rate of return of total railway operations was negligible. Furthermore, the overall variability of the return on the total portfolio of investments which comprised B.R. was also negligible in the 1963-68 period at .37 percent and moderate in the 1969-75 period, at 11.24 percent (see part C of table 8.4). Therefore, B.R.'s claims regarding its need to diversify to reduce its riskiness were unfounded.

3. RELATIONSHIPS WITH GOVERNMENT: CONCLUSION

Overall, therefore, while the influence of Government on B.R.'s operations (as perceived by B.R. itself) has been somewhat exaggerated, it has nevertheless proved to be a genuine element of business risk. As regards pricing, the informal interference of the Government is a matter of historical record. Indeed, the history of the nationalised industries: governmental relationships suggest that this pattern is
Table 9.4  B.R.: Diversification of Investment

A.  Returns on Capital: Averages and Dispersion

<table>
<thead>
<tr>
<th></th>
<th>1963-68</th>
<th></th>
<th>1969-75</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{X}$</td>
<td>$\sigma$</td>
<td>$\bar{X}$</td>
<td>$\sigma$</td>
</tr>
<tr>
<td>Railways (R)</td>
<td>(5.5)</td>
<td>0</td>
<td>(5.4)</td>
<td>0.08</td>
</tr>
<tr>
<td>Shipping (S)</td>
<td>17.4</td>
<td>.04</td>
<td>4.8</td>
<td>.24</td>
</tr>
<tr>
<td>Harbours (HA)</td>
<td>2.6</td>
<td>.12</td>
<td>9.0</td>
<td>0.01</td>
</tr>
<tr>
<td>Hotels (Ho)</td>
<td>9.4</td>
<td>.08</td>
<td>7.4</td>
<td>0.04</td>
</tr>
<tr>
<td>Property (P)</td>
<td>4.9</td>
<td>.08</td>
<td>7.0</td>
<td>0</td>
</tr>
<tr>
<td>Workshops (W)</td>
<td>-</td>
<td>-</td>
<td>1.06</td>
<td>0.08</td>
</tr>
<tr>
<td>Hovercraft (HOV)</td>
<td>-</td>
<td>-</td>
<td>(9.7)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

B.  Returns on Capital: Measures of Association, Pearson's $r$

(a) 1963-1968

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>S</th>
<th>HA</th>
<th>Ho</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>1.0</td>
<td>.003</td>
<td>-.019</td>
<td>.03</td>
<td>-.015</td>
</tr>
<tr>
<td>S</td>
<td>.003</td>
<td>1.0</td>
<td>.08</td>
<td>.03</td>
<td>-.01</td>
</tr>
<tr>
<td>HA</td>
<td>-.019</td>
<td>.08</td>
<td>1.0</td>
<td>.13</td>
<td>.01</td>
</tr>
<tr>
<td>Ho</td>
<td>.03</td>
<td>.03</td>
<td>.13</td>
<td>1.0</td>
<td>-.02</td>
</tr>
<tr>
<td>P</td>
<td>-.015</td>
<td>-.01</td>
<td>.01</td>
<td>-.02</td>
<td>1.0</td>
</tr>
</tbody>
</table>

(b) 1969-1975

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>S</th>
<th>HA</th>
<th>Ho</th>
<th>P</th>
<th>W</th>
<th>HOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>1.0</td>
<td>.64</td>
<td>.57</td>
<td>-.27</td>
<td>.08</td>
<td>-.43</td>
<td>.56</td>
</tr>
<tr>
<td>S</td>
<td>.64</td>
<td>1.0</td>
<td>.57</td>
<td>.22</td>
<td>-.06</td>
<td>-.29</td>
<td>.4</td>
</tr>
<tr>
<td>HA</td>
<td>.57</td>
<td>.57</td>
<td>1.0</td>
<td>.12</td>
<td>-.02</td>
<td>-.17</td>
<td>.02</td>
</tr>
<tr>
<td>Ho</td>
<td>.27</td>
<td>.22</td>
<td>.12</td>
<td>1.0</td>
<td>-.27</td>
<td>-.1</td>
<td>.18</td>
</tr>
<tr>
<td>P</td>
<td>.08</td>
<td>-.06</td>
<td>-.02</td>
<td>-.27</td>
<td>1.0</td>
<td>-.27</td>
<td>.75</td>
</tr>
<tr>
<td>W</td>
<td>-.43</td>
<td>-.29</td>
<td>-.17</td>
<td>-.1</td>
<td>-.27</td>
<td>1.0</td>
<td>-.3</td>
</tr>
<tr>
<td>HOV</td>
<td>.56</td>
<td>.4</td>
<td>.02</td>
<td>.18</td>
<td>.75</td>
<td>-.3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

C.  Diversification of Investment: $\sigma_p$

(a) 1963-68  .37%
(b) 1969-75  11.24%
likely to be repeated in the future. Since such intervention is of an informal nature, it is not possible to eliminate its impact on reported financial results by incorporating the type of compensation systems discussed in chapter 5. As for Government intervention in B.R.'s investment policies, there were two strands to this. The first of these related to the execution of B.R.'s investment programme. One aspect of this was delays in the authorisation of investment by B.R. These delays of which B.R. protested were indeed caused by Government intervention. However, in mitigation, these might have been justified by the inadequacy of B.R.'s techniques of investment appraisal at that time and by its poor track record on investment, plus its heavy reliance on Government finance. However, other aspects of B.R.'s inability to execute its desired investment programme because of Government intervention are legitimate aspects of business risk. Thus it was shown that frequency of changes in capital allocations, plus major uncertainties over the actual amounts to be received were not only 'risk factors' for B.R., but these were also factors which cannot be readily incorporated within the reported financial results in the manner envisaged in chapter 5 for specific acts of Ministerial intervention. If these aspects of B.R.'s investment policies can be regarded as valid elements of business risk, the second aspect of Government intervention in such policies over which B.R. protested (viz., constraints on investment in non-rail activities) was seen to be both largely irrelevant to the present discussion and, indeed, to be overstated by B.R. Furthermore,
those aspects of Government intervention (such as informal pressures on pricing and uncertainties over capital allocations) which might be seen as the lot of nationalised industries, and as genuine elements of business risk, might also be expected to be experienced by the "profitable state railway operating company", as envisaged in Part II of this thesis.
Chapter 10

A QUANTITATIVE ASSESSMENT: AN EXPLORATORY ANALYSIS

As noted in Chapter 1, it is intended to demonstrate within this chapter whether or not equity capital should be introduced into the 'profitable railway operating company', as envisaged in Part II of this thesis. Given the conclusions of previous chapters, which have pointed to:

1. the possibility of a profitable, reconstructed railway operating company (Chapter 2)
2. the appropriateness of its profit objective (Chapters 3 to 6), and
3. the existence of business risk\(^1\) at B.R. (Chapters 7 to 9),

if it can be shown that state railway operating services are as risky as private corporations, a case can be made for them also having risk capital in the form of a private equity stake.

However, there are severe difficulties which inhibit such an investigation. These are examined below by considering:

1. The applicability of the market model of share price behaviour to the estimation of the riskiness of the reconstructed railway operating company.

\(^1\) i.e. variability of returns (as influenced by sales volatility and operating leverage), as defined in Chapter 1, p.22.
2. An extension of the approach to the assessment of the riskiness of the reconstructed railway operating company for Public Dividend Capital, as set out in preceding chapters. This takes the form of an exploratory model.

The following discussion of these matters reveals that the market model of share price behaviour is not directly pertinent to the assessment of the riskiness of the reconstructed railway operating company for equity capital. Nevertheless, empirical evidence in support of this model provides insights into how risk might be quantified. Furthermore, it is also shown below that the extension of the preceding analysis is itself fraught with difficulties. These issues are considered below, as follows:-

1. The Relevance of the Market Model.
2. An Exploratory Model.

1. THE RELEVANCE OF THE MARKET MODEL

The most evident means of making a quantitative analysis of the riskiness of a given corporation, is the use of the market model of share price behaviour (see Chapter 1, p.26). But this cannot be utilised in the assessment of the riskiness of state industries, as they do not have share prices. This means that the coefficient of systematic risk, $\beta$, which represents all forms of risk, is not available as a means by which the riskiness of the reconstructed railway operating company can be assessed.

Nevertheless, an approximation to the market model might be obtained by the use of accounting indicators. Indeed, it was noted in
Chapter 1, (p.27) that there is empirical evidence which suggests that accounting indicators might serve as a proxy for $\beta$, the coefficient of non-diversifiable risk. Therefore, accounting indicators might provide an acceptable index of risk, without the need to make reference to share prices. In this way, effective comparability between the riskiness of private and public sector corporations might be achieved by using measures of risk derived from book values.

However, this alternative must be pursued with caution, as the evidence in support of the use of accounting indicators as a proxy for $\beta$ is not conclusive. Thus, much of this empirical evidence is based on correlations between accounting - and market-determined measures of risk. Such measures of association cannot be interpreted as evidence of causality. Further criticisms can also be made of this evidence. For example, it could be argued that Beaver, Kettler and Scholes (1970) introduced too many accounting indicators of risk in their study, without theoretical justification. This had the outcome that many indicators showed poor results, with the exception of variability of earnings, financial leverage and dividend payout. On the other hand, the Lev (1974) study (which examined the relationship of operating leverage and systematic risk) had low measures of $R^2$, suggesting that important determinants of risk had been left out of his regression model.

Overall (at least), this type of empirical evidence provides insights into the relationships between accounting measures of risk and systematic risk. It does not provide a unique accounting indicator,
nor a unique set of such indicators, which might serve as a proxy for $\beta$. Therefore, it was necessary to devise a model to perform a quantitative analysis of the riskiness of the reconstructed railway company. The model which was constructed, and its associated problems, are the subject of the following section of this chapter.

2. AN EXPLORATORY MODEL

This section of this chapter outlines an exploratory model which was developed as an extension of the assessment of the riskiness of the reconstructed railway operating company for purposes of Public Dividend Capital. In Chapters 1 to 9, the relevance of Public Dividend Capital to the reconstructed railway operating company was based on a comparison of financial leverage and business risk. Thus, it was suggested that the existing financial leverage of B.R. (which has no P.D.C.) is too high for the reconstructed railway operating company, given the degree to which it would be exposed to business risk. This conclusion was based on a widely held view that financial leverage is related to business risk.\(^2\)

\(^2\) Thus, it is generally held (as noted in Chapter 1, p.22) that the extent to which the financial risks of a given corporation might be shared between, (1) long-term finance with fixed-interest obligations, and (2) long-term finance with variable returns (i.e. equity/P.D.C.), is related to the degree of business risk experienced by that corporation. That is, ceteris paribus, the higher the degree of business risk, the less debt capital that a given corporation will have (and vice-versa). See, for example, Archer and D'Ambrosio (op.cit.) pp.412-430, and Bierman and Hass (op.cit.) pp.93-107. An exception to this is the minority viewpoint (as espoused most notably by Modigliani and Miller) that, in the estimation of the riskiness of a given corporation by the capital market, capital structure is irrelevant. However, this latter circumstance is well recognised as only holding true where capital markets are perfect and there are no taxes, a situation which does not hold true in the real world (see, for example, Haley and Schall (1979), Chapter 11).
However, the extension of this approach to the quantitative analysis of risk in the context of a private equity stake is problematic. The comparability of financial leverage and business risk of private and state corporations is not a straightforward affair. Indeed, the single most important difficulty in the construction of a model which seeks to examine financial leverages and business risk in the private and public sectors is the need to specify the precise relationship between financial risk and business risk. This relationship cannot readily be expressed in a simple, functional form. A major reason for this is the nature of the data available for such empirical research. Its limitations pose problems for both the specification, and the statistical testing, of an exploratory model. These issues are examined below, in the following sequence:

(i) Estimation problems,
(ii) Formulation of an exploratory model,
(iii) Preliminary results.

(i) Estimation problems
The estimation problems associated with the exploratory model tested are of two types: (a) those arising in the specification of the model, and (b) statistical limitations of the data utilised. Estimation problems under heading (a) are general to the problem of risk assessment for capital financing in state industries. To a lesser extent, the problems under heading (b) are also applicable to other state industries, but, usually, the difficulties encountered are specific to the data collected for this study. These aspects of the estimation difficulties encountered are considered, in turn.
(a) Model specification: some major difficulties

As noted above, a formidable problem in the construction of an exploratory model of this nature is the need to precisely specify the relationship between (1) financial risk and (2) business risk. The following discussion shows that the measurement of each of these aspects of risk poses the most significant barrier to model specification.

(1) Financial Risk

As regards financial risk, this can readily be expressed as financial leverage. This is best measured by the use of market values of share prices and debt. In this way, a measure of financial leverage is obtained which is sensitive to the dynamics of the market-place. However, as noted above, no share prices are available for state industries, as ownership of such corporations is vested in the State. Also, the debt finance of state industries is not raised on the Stock Exchange, but is arranged by the State through the National Loans Fund. Therefore, to achieve comparability between private and public sector corporations, it was necessary to use nominal values in the measurement of financial leverage.

In mitigation of this, there is some evidence which suggests that financial leverages measured on the basis of nominal values are of importance in assessing the riskiness of quoted companies. Thus, Beaver, Kettler and Schole (op.cit.) found that this measure of financial leverage was highly correlated with a measure of systematic risk based on market values. On the other hand, Hamada (1972) found
that financial leverage, as measured by market values, was an important determinant of systematic risk. Furthermore, Breen and Lerner found that correlations of financial leverages using book values and an estimate of β, based on market values, behaved inconsistently. Indeed, nominal values might be expected to be static, relative to those obtained in the market-place. As such, they are unlikely to provide the same measure of financial leverage as that obtained by market values, unless the corporation in question has a market capitalisation which exhibits exceptional stability. The prospects of improving upon this aspect of the model's specification are assessed below, in the discussion of directions for future research.

(2) Business Risk

The specification of what constitutes business risk also presents major difficulties. The concept of business risk utilised so far has been that of variability of earnings. Thus, the impact of the 'qualitative' elements of business risk, (i.e. market pressures, industrial relations, and Government relations, as examined in Chapters 7 to 9) were discussed in the context of their impact on the variability of reported financial results. This concept of what constitutes business risk has widespread support in the finance literature.

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5 As noted in Chapter 1, p.22.
The importance of the variability of earnings in determining the riskiness of businesses has also received considerable support from numerous empirical studies which have sought to examine its relationship with that of indicators of riskiness derived from the market-place. 6

Nevertheless, reservations might be expressed over its usefulness, specifically in the context of the comparability of riskiness in the private and public sectors. 7 It might be argued that the use of variability of earnings is too narrow a measure of business risk.

6 This empirical evidence is of two types: that which demonstrates an association between earnings volatility and systematic risk, as cited above (e.g. Beaver, Kettler and Scholes (op.cit.), Lev (op.cit.), Beaver and Manegold (op.cit), Beaver, Clarke and Wright (op.cit), and that which demonstrates a significant, consistent, positive correlation between changes in earnings and changes in share prices. Examples of studies in this latter category include Benston, G., "Published Corporate Accounting Data and Stock Prices", Empirical Research in Accounting: Selected Studies, Supplement to Journal of Accounting Research (1966); Ball, R. and P. Brown, "An Empirical Evaluation of Accounting Income Numbers", Journal of Accounting Research (1968); P. Brown, "The Impact of the Annual Net Profit Report on the Stock Market", The Australian Accountant (July, 1970); Beaver, W.H., "The Information Content of Annual Earnings Announcements", Empirical Research in Accounting: Selected Studies, Supplement to Journal of Accounting Research (1968); R.G. May, "The Influence of Quarterly Earnings Announcements on Investor Decisions as Reflected in Common Stock Price Changes", Empirical Research in Accounting: Selected Studies, Supplement to Journal of Accounting Research, (1971), and Beaver, Clarke and Wright (op.cit.).

7 These reservations are of a conceptual and a practical nature. At this stage, only the conceptual implications are considered. Consideration of the practical implications of how to measure variability of earnings is postponed until the discussion of the formulation of an exploratory model, below.
Thus, it was noted in Chapter 1 (pp.11-13), that the proponents of equity capital argue that the nature of business risk is fundamentally different in the private and public sectors. Specifically, it has been suggested that a major element of business risk within the private sector is the possibility of liquidation, with the prospect of a consequent capital loss for equity shareholders. However, the Government has acknowledged the absence of the threat of liquidation to state industries.8

It might be expected that the prospects, and consequences, of liquidation are reflected in the market prices of shares. Indeed there is empirical evidence available which supports this viewpoint.9 Therefore, given the absence of share prices in state industries, it is necessary to widen the definition of business risk beyond variability of earnings alone, if a meaningful comparability between the financial characteristics of state and private sector corporations is to be achieved. In this respect, considerable research has been conducted

9 Thus Beaver, W.H., ("Market Prices, Financial Ratios and the Prediction of Failure", Journal of Accounting Research, 1968), concluded that investors appear to adjust to the new solvency positions of failed companies on a continuous basis over a five year period prior to failure. This was confirmed in a study by R. Westerfield ("Pre-bankruptcy Stock Price Performance", Working Paper, University of Pennsylvania (1970), as reported in Foster, G., Financial Statement Analysis (1978), Prentice-Hall. More recently, A. Castagna and Z. Matolcsy ("The Market Characteristics of Failed Companies: Extensions and Further Evidence", Journal of Business Finance and Accounting, Winter, 1981) reported that investors adjusted market prices approximately thirty months prior to failure. The difference between this finding and those of Beaver and Westerfield was attributed to institutional differences between the U.S. and Australian stock markets.
into the prediction of corporate failure which offers a possible means of doing this. However, the findings of this research must be handled with care. In the first instance, this empirical work has discovered ratios which are good predictors of failure, but on the basis of studies carried out on firms which have failed. Such ex post studies are interesting, but cannot be treated as conclusive until confirmed by studies which predict corporate failures, before they occur. Also, as regards the relevance of such research to this particular study, there is little unanimity over which ratios might be used as the best predictors of corporate failure. Furthermore, and of even greater importance in this study, is the nature of the corporate failure which is to be measured. It was noted above that nationalised industries are not allowed to 'fail' (in the sense of actual liquidation), as a matter of Government policy. Therefore, to achieve comparability of private and public sectors, it is necessary to obtain


11 Thus, Beaver's (op.cit.) study concluded that conventional measures of liquidity, such as the current ratio, have no predictive ability. On the other hand, Altman's models do have a liquidity measure which improves predictive ability.
a measure of the likelihood of liquidation which precedes, but falls short of, actual liquidation. In other words, a measure which indicates the threat of liquidation to a private sector corporation, but which the State might choose to disregard in the case of a state industry. The most evident means of doing so is that of technical insolvency, as measured by conventional liquidity ratios. However, the limitations of these ratios are well known. Furthermore, these ratios do not encompass all aspects of the possibility of liquidation. Specifically, they do not include a measure of the prospective capital loss in a liquidation. The issue of how it might be possible to extend the conventional measure of business risk to include these aspects is discussed further below, in the section of this chapter devoted to the formulation of an exploratory model.

(b) Statistical limitations of the data

The data utilised to test the exploratory model (as described below), and its limitations, are set out within this section. These matters are discussed in two parts: (1) private sector companies, and (2) railway companies.

(1) Private Sector Companies

The data for private sector companies was drawn from Extel statistical services. All of the 120 private sector companies included in the study are major corporations within their respective industries. They are all quoted on the London Stock Exchange (as
would be the reconstructed railway operating company if it was privately-owned). The private sector companies included in the study were from three industries (textiles, buildings and stores) for the period 1970-1980.

Since the companies included are not a random sample of the total companies quoted on the London Stock Exchange, the results of this study cannot, strictly speaking, be generalised beyond the companies included in this study. However, there are two factors which mitigate the selection of distinct industries, as opposed to a random sample of all companies quoted on the Stock Exchange. In the first instance, the industries selected have financial leverages which are not markedly different from the majority of industries. Thus, as table 10.1 shows, the industries selected - 'building' (housebuilders, builders merchants, builders and civil engineers, building materials, building products); 'stores' (multiple department stores, furniture retailers, high street shops) and 'textiles' (wool textiles, other textiles) - have financial leverages which are comparable to other industries. Two major exceptions to this are shipping and plant hire. Thus, while most industries have relatively low financial leverages,¹² only shipping and plant hire have rather higher ones, on the whole. Therefore, it might be argued that the industries selected, as ones with low financial leverages (and, presumably, risky trading conditions) represent a useful benchmark

¹² This characteristic of private sector corporations with quotations on the London Stock Exchange has been reported upon in earlier studies. See, for example, Henderson and Tew (1959) and Coates and Woolley (1975).
Table 10.1 Private Sector Financial Leverages*

<table>
<thead>
<tr>
<th>Industry</th>
<th>Financial Leverage (%)</th>
<th>0-19.9</th>
<th>20-39.9</th>
<th>40-59.9</th>
<th>60-79.9</th>
<th>80-99.9</th>
<th>100-119.9</th>
<th>120 and over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brewers</td>
<td>%</td>
<td>53</td>
<td>26</td>
<td>16</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wines and Spirits</td>
<td>%</td>
<td>25</td>
<td>33</td>
<td>8</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>17</td>
</tr>
<tr>
<td>Housebuilders**</td>
<td>%</td>
<td>18</td>
<td>18</td>
<td>12</td>
<td>6</td>
<td>12</td>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>Builders Merchants**</td>
<td>%</td>
<td>27</td>
<td>9</td>
<td>19</td>
<td>18</td>
<td>1</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Builders &amp; Civil Engineers**</td>
<td>%</td>
<td>47</td>
<td>18</td>
<td>18</td>
<td>1</td>
<td>12</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Building Materials**</td>
<td>%</td>
<td>12</td>
<td>63</td>
<td>7</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Building Products**</td>
<td>%</td>
<td>33</td>
<td>19</td>
<td>19</td>
<td>5</td>
<td>5</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Chemicals</td>
<td>%</td>
<td>22</td>
<td>22</td>
<td>33</td>
<td>12</td>
<td>11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>%</td>
<td>29</td>
<td>33</td>
<td>19</td>
<td>10</td>
<td>-</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>Furniture manufacture</td>
<td>%</td>
<td>53</td>
<td>20</td>
<td>13</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Hotels</td>
<td>%</td>
<td>15</td>
<td>8</td>
<td>16</td>
<td>15</td>
<td>23</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Machine tools</td>
<td>%</td>
<td>32</td>
<td>18</td>
<td>27</td>
<td>14</td>
<td>5</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Motor components</td>
<td>%</td>
<td>15</td>
<td>23</td>
<td>38</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Plant hire</td>
<td>%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>34</td>
<td>-</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>Multiple dept stores**</td>
<td>%</td>
<td>50</td>
<td>14</td>
<td>29</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Furniture retailers**</td>
<td>%</td>
<td>22</td>
<td>44</td>
<td>11</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>High street shops**</td>
<td>%</td>
<td>52</td>
<td>22</td>
<td>19</td>
<td>4</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Shipping</td>
<td>%</td>
<td>12</td>
<td>-</td>
<td>6</td>
<td>12</td>
<td>29</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td>Wool textiles**</td>
<td>%</td>
<td>25</td>
<td>25</td>
<td>19</td>
<td>13</td>
<td>6</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td>Other textiles**</td>
<td>%</td>
<td>26</td>
<td>16</td>
<td>32</td>
<td>11</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Heavy engineering</td>
<td>%</td>
<td>43</td>
<td>36</td>
<td>14</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other engineering</td>
<td>%</td>
<td>40</td>
<td>33</td>
<td>13</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>All Industry Averages</td>
<td>%</td>
<td>33</td>
<td>21</td>
<td>17</td>
<td>11</td>
<td>6</td>
<td>36</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Drury and Bougen (1980).

* borrowing as a percentage of shareholders funds as at 1977.
** included in the detailed analysis in the main text.
against which to assess the riskiness of railway operating companies, which might be expected to exhibit similar characteristics. A second reason for the selection of specific industries, rather than a random sample of companies, is to aid the exploratory analysis. Thus, in this exploratory analysis, entire industries, rather than a random scatter of individual companies, enables critical variables to be computed in a more meaningful way, as discussed below, in the formulation of the exploratory model.

(2) Railway Companies

The railway companies included in this study are shown in table 10.2. The data regarding these companies was obtained from Annual Reports and Accounts (B.R., plus U.S. railroads); from the annual reports of the International Union of Railways (U.I.C.), from 1970-78; and from Statistics Canada; Railway Transport Financial Statistics from 1970-79.

It is evident from table 10.2 that a dichotomy exists between state-owned and privately-owned railways. As such, this basic division in the nature of railroads appears to facilitate financial analysis of corporations in the public and private sectors. However, there are a number of caveats to this. In the first instance, as noted in Chapter 6 (p.206), international comparisons of railway companies are made difficult by their differing circumstances - geographical, historical and managerial/institutional. Thus, the structure of world railways has evolved in a distinctive fashion, in which railways are predominantly state-owned, with the exception of those in North America. It might be argued, therefore, that private railways in the North American
Table 10.2  Railway Companies Included in this Study

<table>
<thead>
<tr>
<th>State-owned</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swedish State Railways</td>
<td>Aitchison, Topeka &amp; Santa Fe</td>
</tr>
<tr>
<td>British Rail</td>
<td>Seaboard Cost Line</td>
</tr>
<tr>
<td>Canadian National</td>
<td>Burlington Northern</td>
</tr>
<tr>
<td>Hellenic State Railway</td>
<td>Southern Pacific</td>
</tr>
<tr>
<td>Swiss Federal Railways</td>
<td>Norfolk and Western</td>
</tr>
<tr>
<td>Luxembourg National</td>
<td>Missouri-Kansas-Texas</td>
</tr>
<tr>
<td>Irish Transport Co.</td>
<td>Chicago &amp; North Western</td>
</tr>
<tr>
<td>German Federal Railway</td>
<td>Southern Railway</td>
</tr>
<tr>
<td>Danish State Railways</td>
<td>Consolidated Rail</td>
</tr>
<tr>
<td>Italian State Railways</td>
<td>Kansas City Southern</td>
</tr>
<tr>
<td>Norwegian State Railways</td>
<td>Missouri Pacific</td>
</tr>
<tr>
<td>Netherlands Railways</td>
<td>Illinois Central</td>
</tr>
<tr>
<td>Austrian Federal</td>
<td>Union Pacific</td>
</tr>
<tr>
<td>Spanish National</td>
<td>Canadian Pacific</td>
</tr>
<tr>
<td>Belgium National</td>
<td>British Columbia</td>
</tr>
<tr>
<td>French National</td>
<td>Canada Southern</td>
</tr>
<tr>
<td>Moroccan Railways</td>
<td>Northern Alberta</td>
</tr>
<tr>
<td>Tunisian National</td>
<td>Ontario Northland</td>
</tr>
<tr>
<td>Cameroun National</td>
<td>Quebec, North Shore</td>
</tr>
<tr>
<td>Algerian National</td>
<td>Algoma Central</td>
</tr>
<tr>
<td>Israel State Railways</td>
<td>Other Canadian Class II Railways</td>
</tr>
<tr>
<td>Turkish State Railways</td>
<td>Bernese (B.L.'s)</td>
</tr>
<tr>
<td>South African Railways</td>
<td></td>
</tr>
<tr>
<td>Japanese National</td>
<td></td>
</tr>
<tr>
<td>Taiwan Railway</td>
<td></td>
</tr>
<tr>
<td>Finnish State Railways</td>
<td></td>
</tr>
<tr>
<td>Brazilian Railways</td>
<td></td>
</tr>
<tr>
<td>Portuguese Railway</td>
<td></td>
</tr>
</tbody>
</table>

356
countries are exposed to a quite different social and economic environment, which sets them apart from the typical state-owned railway. For this reason, the exploratory model was tested on private railways as a distinct group, separate from that of state railways. Indeed, the state railways were also analysed as a distinct group. However, it might be argued that there is no such thing as a 'typical' state railway and that those companies comprising the 'state-owned' classification in table 10.7 are themselves exposed to differing economic and social circumstances which make them less of a homogeneous group than they might seem at first sight.\textsuperscript{13}

Also, apart from such differences which underlie the economic realities of railway companies, international comparisons of this nature are made difficult by differences in international accounting practices, which might distort the measurement of key variables. This is mitigated in the case of the private sector railways by treating them as a distinct group, because U.S. railroads prepare their annual accounts on the same basis. This is also mitigated, in part, in the case of the non-North American railways comprising the 'state railway' classification, as these companies are required to submit financial information to the U.I.C. on a standardised basis. Nevertheless, the basis of accounting by state railways is not regulated in a manner comparable to that of

\textsuperscript{13} An example of such differences would be different, typical financial leverages in a given country, reflecting different conventions regarding the mix of debt and equity and/or different attitudes to (financial) risk. Thus, Coates and Woolley (op.cit.), note different 'norms' for financial leverages in E.E.C. countries.
U.S. railroads. Perhaps the single most important variable which might distort such international financial comparisons is the differing impact of inflation in different countries. However, there is some empirical evidence which suggests that the structure of financial ratios can be the same, whether these are computed under historic cost or are adjusted for inflation. Therefore, the effects of inflation need not exacerbate international comparisons. However, the limited nature of this evidence must be stressed. Indeed, in the analysis which follows, all of the above limitations of this data must be borne in mind, as constraints upon the effective empirical testing of the exploratory model.

(ii) Formulation of an exploratory model

The above discussion has outlined the proposed specification (and associated difficulties) of the exploratory model. The actual formulation, its rationale and the hypotheses to be tested are set out here. This is followed by a closer examination of the variables which comprise the model.

(a) The model

An exploratory model was formulated as a multiple regression analysis, in which the independent variable, financial leverage, was

---

expressed as a function of business risk. This took the following form:

\[ Y_i = a + b.X_{1i} + c.X_{2i} + d.X_{3i} + e_i \]

where:

- \( Y \) is financial leverage
- \( a \) is a constant, representing average levels of riskiness, unexplained by the independent variables utilised
- \( X_1 \) is a measure of variability of profits
- \( X_2 \) is a measure of the threat of liquidation
- \( X_3 \) is a measure of the value of assets in the event of liquidation
- \( i \) refers to the \( i \)th corporation
- \( e \) is the usual random error term.

The fundamental notion which it is intended to test with this exploratory model is the proposition that the financial leverage of state railways (including B.R.), as one which is imposed by Governments, will not be related to the riskiness of their operations. This contrasts with private sector corporations, in which it might be expected that the capital markets are sensitive to different degrees of risk. Therefore, this will be reflected in the extent to which a given corporation can trade on its equity, thereby altering its mixture of debt and equity. Thus, the basic premise advanced is that, whereas the capital markets might be expected to be responsive to the mix of different instruments of long term finance by individual corporations
of different risk classes, the institutionally-imposed 'solutions' of Governments to state railways' long term capital financing needs will not.

The hypotheses which were tested were as follows:

HYPOTHESIS 1: (H01) In general, the financial leverage of state-owned railways is not related to their level of business risk.

HYPOTHESIS 2: (H02) In general, the financial leverage of private sector railways is related to their level of business risk.

HYPOTHESIS 3: (H03) In general, the financial leverage of private sector companies is related to their level of business risk.

(b) The variables

The actual measures used for the variables $Y, X_1, X_2$ and $X_3$ in the regression model are set out below. In this respect, $X_1$ (variability of profits), $X_2$ (the 'threat' of liquidation), and $X_3$ (the value of assets in the event of liquidation) comprise the measure of business risk.

(1) Financial Leverage

Financial leverage, $Y$, was based on nominal values and measured as -

$$\frac{\text{Long-term debt}}{\text{Long-term debt + equity}}$$

in which equity includes all retained profits and reserves. The precise measure utilised was the mean score derived for the periods
set out above, in 'statistical limitations of the data'. An exception to this was the private sector companies, for which balance sheet details were not available for the entire 1970-80 period, which resulted in a mean score for leverage based on 1976-80. Certain private railroads were also affected in a similar way.

The differing financial leverages of the private sector companies and the railway companies are shown in table 10.3. This reveals that:

(a) the financial leverages of the private sector companies are typically lower than those of the railway companies,

(b) the private sector railways tend to have higher financial leverages ($X = .49$) than those of state railways ($X = .39$)

A further aspect of the financial leverages of state railways is the existence of six national railways which have significantly higher financial leverages than other state industries and, indeed, than those of any other corporation within the private sector railways and private sector non-rail industries shown in table 10.3. These are as follows (with $X$ in brackets): B.R. (.80), Swiss Federal Railways (.84), Belgian State Railways (.72), French State Railways (.76), Japanese State Railways (.78) and Portuguese Railways (.85). Therefore, the possibility of a distinct subset (comprising these railways) within the state railways is examined.

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15 The actual railroads affected and the periods covered were as follows: Seaboard Coast Line (1973-79), Consolidated Rail Corporation (1976-80), Kansas City Southern Inds (1974-80), Missouri-Pacific (1977-80), Illinois Central Gulf (1975-80).
<table>
<thead>
<tr>
<th></th>
<th>$\bar{x}$</th>
<th>$\sigma$</th>
</tr>
</thead>
<tbody>
<tr>
<td>State railways</td>
<td>.39</td>
<td>.29</td>
</tr>
<tr>
<td>(n = 28)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private railways</td>
<td>.49</td>
<td>.20</td>
</tr>
<tr>
<td>(n = 22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Railways (n = 50)</td>
<td>.43</td>
<td>.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textile Industry</td>
<td>.12</td>
<td>.13</td>
</tr>
<tr>
<td>(n = 41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Trades</td>
<td>.16</td>
<td>.12</td>
</tr>
<tr>
<td>(n = 39)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stores</td>
<td>.10</td>
<td>.08</td>
</tr>
<tr>
<td>(n = 40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Private Sector (n = 120)</td>
<td>.13</td>
<td>.13</td>
</tr>
</tbody>
</table>

Source: compiled from sources of data as set out in this Appendix.

* expressed as long term debt as a percentage of long term debt plus equity.
Variability of Profits

It was suggested above that reservations might be expressed over the usefulness of variability of profits as a measure of business risk on both conceptual and practical grounds. The introduction of variables $X_2$ and $X_3$ into this analysis is an attempt to overcome certain conceptual reservations, by widening the definition of business risk. Nevertheless, there are still potential difficulties associated with the use of variability of profits. These are discussed below, after the description of the measures of variability of profit utilised in this study.

Two measures of profits earned were employed in this study:
- earnings before interest and taxation (E.B.I.T.),
- return on fixed assets (R.O.F.A.).

As regards E.B.I.T., the selection of earnings before interest is necessary, given that the aim of this study is the assessment of the appropriate mix of debt and equity for railways. Any income measure after interest used for these purposes would distort the issue, given their differing capital structures. Furthermore, in the case of railway companies, their actual E.B.I.T. was adjusted for costs related to the railway infrastructure (i.e. the maintenance of way and structures, signalling and joint costs, including central administrative costs) to obtain an estimate of operating profits of the reconstructed railway. This measure serves as a proxy for railway operating company profits, which cannot actually be known unless and until segregation of the operating services and infrastructure takes place. In most cases,
E.B.I.T. was based as closely as possible on a ten year profit record. This covered the periods set out above in 'statistical limitations of the data', with a few exceptions, notably U.S. railroads, for which only shorter periods were available.\textsuperscript{16}

As for R.O.F.A., the E.B.I.T. measure was used as the numerator in its calculation. R.O.F.A.'s denominator, in the case of railway companies, was the net book value of rolling stock. However, this data was not available for all railway companies, particularly Canadian ones, which were therefore excluded from this version of the analysis. Intangibles and other assets were excluded from the denominator of the private sector companies' measure, partly because of the arbitrary nature of their measurement, but also to avoid any unnecessary deflation of results vis-à-vis those of the railway companies. The period covered in the calculation of this measure was the same as that for E.B.I.T., with the exception of private sector companies, for which data was only available from 1976-80.

The index of risk employed, for both E.B.I.T. and R.O.F.A., was the coefficient of variation, i.e. the standard deviation of each variable for each company, deflated by its mean score to adjust it for size or scale of operation. The average measures obtained for this index of variability of returns, and their dispersion, are shown in table 10.4 for the principal categories of corporation included in this study. This reveals that, while the industries comprising the 'private sector'

\textsuperscript{16} See footnote 15 above.
Table 10.4  Average and Dispersion of Measures of Variability of Returns*

<table>
<thead>
<tr>
<th>Category</th>
<th>E.B.I.T.</th>
<th>R.O.F.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{x}$</td>
<td>$\sigma$</td>
</tr>
<tr>
<td>1. State railways</td>
<td>.36</td>
<td>.20</td>
</tr>
<tr>
<td>(n = 27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Private railways</td>
<td>.29</td>
<td>.13</td>
</tr>
<tr>
<td>(n = 22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Private sector</td>
<td>.47</td>
<td>.17</td>
</tr>
<tr>
<td>(n = 120)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Textiles</td>
<td>.48</td>
<td>.16</td>
</tr>
<tr>
<td>(n = 41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Building</td>
<td>.49</td>
<td>.15</td>
</tr>
<tr>
<td>(n = 39)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Stores</td>
<td>.43</td>
<td>.15</td>
</tr>
<tr>
<td>(n = 40)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: compiled from sources of data as set out in the main text.

* as defined in the main text
exhibit similar patterns, individually and in aggregate, these results are very different from those obtained for both types of railways, private- and state-owned. Such differences are reflected in the analysis below, in which the model was tested for each of these groups.

This measure of variability of returns has been extensively used in empirical research and has considerable support in authoritative writings within the finance literature. It has its intellectual roots in utility theory. It has also been advocated, and utilised, in the context of the measurement of risks associated with portfolios of assets by Markowitz (op.cit.), and Sharpe. However, a possible criticism of this measure of risk has been posed by Van Horne. Specifically, he suggests that investors do not perceive risk as variability, per se, but as a 'downside' deviation from an expected value. That is, 'upside' deviations from an expected value might not be considered undesirable by an investor. Nevertheless, Van Horne (op.cit. p.33) himself, persists

17 For examples of empirical research using this measure, see Beaver, Kettler and Scholes (op.cit.), Lev (op.cit.), and Gahlon (op.cit.); authoritative writings which advocate this approach are these by Archer and D'Ambrosio (op.cit.), Bierman and Hass (op.cit.), and Haley and Schall (op.cit.).


in the advocacy of the standard deviation (or the coefficient of variation) as a measure of risk, on the grounds that it takes account of all divergences from the actual return expected.

A further possible criticism of this measure of risk, as applied in practice, is the need to use historic income streams, rather than the expected value of future income, given the unavailability of the latter. This means that the historic average serves as a proxy for 'expected value'. One particular difficulty with this is the impact of inflation on reported financial results. If this systematically increases the value of earnings, year after year, it could distort the measurement of the variability of returns using the standard deviation on the coefficient of variation. That is, the standard deviation (and, therefore, the riskiness) of a given corporation with a persistent increase in earnings (arising from inflation) could be higher than that of a corporation with earnings which fluctuate year after year.

In fact, the railway companies (state-owned and private) did not display such consistent increases in their reported earnings, with minor exceptions. Also, while this inflation factor appears to have influenced certain of the reported financial results of the U.K. private sector corporations, this is confined to one version of the 'variability of returns', viz., E.B.I.T., and, furthermore, it is largely confined to one industry, stores (with twelve corporations reporting a continual

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21 Thus, in private railways, Burlington Northern and Union Pacific reported year on year increases in earnings; in state railways, Finnish State Railways and South African Railways did likewise.
increase in earnings) and, to a lesser extent, building trades (with four such corporations). This might indicate that international and domestic competitive pressures generally proved to be of greater significance in determining the level of, and changes in, a given corporation's earnings than the rate of inflation. A segregation of the results for individual industries (as mentioned in the following section) permits some assessment of the significance of this problem.

(3) The Threat of Liquidation

It was noted above that the Government would not allow a state industry to go into liquidation. Therefore, to achieve comparability of the riskiness of private and public sector corporations, some measure which fell short of actual liquidation, but usually preceded it, was necessary. This would therefore seek to eliminate the influence of the Government as a guarantor of state industries. The measurement of the 'likelihood of liquidation' which was employed in this study was based on indicators of the solvency position of the corporations included in the analysis. The details of how $X_2$, the 'threat of liquidation' was actually measured are set out below, in two parts. First of all, the accounting ratios utilised and their possible defects are discussed. Secondly, the means by which the index of 'the threat of liquidation' was constructed are set out.

The accounting ratios utilised to determine the solvency position of the corporations in this study included the conventional working capital (or current) ratio and the quick (or 'acid test') ratio, viz:
(a) Working capital ratio = \( \frac{\text{Current assets}}{\text{Current liabilities}} \)
(b) 'Quick' ratio = \( \frac{\text{Current assets less stock}}{\text{Current liabilities}} \)

However, these ratios are not without defects. Thus, alternative (a) has the deficiency that, not only is the stock figure included in current assets likely to be distorted between companies because of different bases of valuation, but it is also misleading on the grounds that its worth is dependent on future sales or services rendered and, in the event of a liquidation, it is unlikely to realise its book value. This is overcome by using alternative (b), but a reservation which this measure has in common with (a) is that it is amenable to window-dressing, in which year-end debtors and creditors are inflated or deflated to present a more favourable ratio. As a consequence, alternative measures to both (a) and (b) have been proposed.\(^{22}\) Such alternatives seek to measure solvency in terms of flows of funds into organisations. One such measure, the ratio of operational net cash flows to interest charges, was proposed, and utilised to good effect, by Altman in a prediction of railroad bankruptcies in the U.S.\(^{23}\) This latter measure is also utilised in this study, in an attempt to overcome the deficiencies of

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\(^{22}\) See, for example, Walter, J.E., "Determination of Technical Solvency", \textit{Journal of Business}, January, 1957.

\(^{23}\) Altman, E.I., "Predicting Railroad Bankruptcies in America", \textit{Bell Journal of Economics}, Spring, 1973. However, this is only one of many such alternatives. Another approach would be that proposed by Lee, T.A., in which the risk of liquidation might be expressed as cash flow (numerator) to debt (denominator), see "Towards a Practice of Cash Flow Analysis", Discussion Paper 13, Dept of Accounting, University of Edinburgh, July, 1982.
alternatives (a) and (b). In this measure, O.N.C.F. was measured as
\(- E.B.I.T. + \text{Depreciation} + (\text{Opening Debtors} + \text{Opening Stock} + \text{Closing Creditors}) - (\text{Closing Debtors} + \text{Closing Stock} + \text{Opening Creditors})\). In all cases, O.N.C.F. was measured for the three most recent years available; for both the Working Capital Ratio and the Quick Ratio, the periods covered were 1976-80 for private sector companies, and those periods set out above for the railway companies.

As for the actual construction of the index of the threat of liquidation, three versions were made, utilising the three measures of solvency as set out above, for all of the industries included in this study. For this purpose, all privately-owned railways were treated as a distinctive group, as were the state-owned railways,\(^{24}\) In constructing the index the mean score for a given industry was computed for each measure. In this calculation, any extreme values for a given liquidity measure were excluded. The resulting mean score was considered to be the typical value which was required to survive in that industry. The actual values of the constituent firms in the industries within this study were converted to percentage points, with the mean score or 'survival threshold' set at .5. Higher values were assigned a higher percentage point; lower values were assigned a lower percentage point. Any extreme scores set aside in the calculation of the 'survival threshold' were assigned the highest or lowest percentage point, dependent on whether they were extremely high or extremely low values.

\(^{24}\) It is important to note that the limitations implicit in (a) international comparisons and (b) the homogeneity of these two groups of railroads still apply. Therefore, these results should be interpreted with caution.
As an example of the construction of such an index, consider the case of the 'quick' ratio for stores. Two extreme values were identified: .002 as an extremely low 'quick' ratio; .71 as an extremely high 'quick' ratio (i.e. relative to all other firms in this industry). The mean score ('survival threshold') was .17. This was set at .5 of the 'survival index'. The points on this index to which other firms were assigned were determined by setting the highest (non-extreme score) at 1.0 and the lowest (non-extreme score) at .1. The intermediate points on the scale were established at equal intervals in the following fashion:

<table>
<thead>
<tr>
<th>Actual Value</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ .01</td>
<td>.1</td>
</tr>
<tr>
<td>.05</td>
<td>.2</td>
</tr>
<tr>
<td>.09</td>
<td>.3</td>
</tr>
<tr>
<td>.13</td>
<td>.4</td>
</tr>
<tr>
<td>.17</td>
<td>.5 ('threshold')</td>
</tr>
<tr>
<td>.21</td>
<td>.6</td>
</tr>
<tr>
<td>.25</td>
<td>.7</td>
</tr>
<tr>
<td>.29</td>
<td>.8</td>
</tr>
<tr>
<td>.33</td>
<td>.9</td>
</tr>
<tr>
<td>≥ .37</td>
<td>1.0</td>
</tr>
</tbody>
</table>

The extremely low score was assigned the value .1, the extremely high score was assigned the value of 1.0. For other firms, those with 'quick' ratios in the designated bands were given the corresponding point on the scale: for example, a 'quick' ratio of .085 was set at .3; a quick ratio of .16 was set at .5 and so on. Frequently distributions of the scores arrived at in this fashion for each of the specific industries included in this study are shown in tables 10.5 and 10.6.
Table 10.5  Frequency Distribution of Variable X2, 'The Threat of Liquidation', Railways

<table>
<thead>
<tr>
<th>% Points of Index</th>
<th>Measure of Solvency</th>
<th>Working Capital Ratio</th>
<th>'Quick' Ratio</th>
<th>O.N.C.F./Int.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>State ( (\bar{X} = 1.13) )</td>
<td>Private ( (\bar{X} = 1.2) )</td>
<td>State ( (\bar{X} = 0.36) )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>no of firms</td>
<td>no of firms &amp; no of firms</td>
<td>no of firms</td>
</tr>
<tr>
<td>0.1</td>
<td></td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>0.2</td>
<td></td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>0.3</td>
<td></td>
<td>5</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>0.4</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>0.6</td>
<td></td>
<td>3</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>0.7</td>
<td></td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>0.8</td>
<td></td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>0.9</td>
<td></td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>1.0</td>
<td></td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

\((n = 28)\) \((n = 22)\) \((n = 28)\) \((n = 22)\) \((n = 25*)\) \((n = 20*)\)

* in certain firms, the interest charges were not available: these were therefore excluded from the analysis
Table 10.6  Frequency Distribution of Variably X₂, 'The Threat of Liquidation', Private Sector

<table>
<thead>
<tr>
<th>% Points of Index</th>
<th>Solvency Measure</th>
<th>Working Capital Ratio</th>
<th>'Quick' Ratio</th>
<th>O.N.C.F./Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Textiles (X = 2.15)</td>
<td>Building (X = 1.7)</td>
<td>Stores (X = 1.6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>nof firms</td>
<td>nof firms</td>
<td>nof firms</td>
</tr>
<tr>
<td>.1</td>
<td></td>
<td>8</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>.2</td>
<td></td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>.3</td>
<td></td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>.4</td>
<td></td>
<td>8</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>.5</td>
<td></td>
<td>8</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>.6</td>
<td></td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>.7</td>
<td></td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>.8</td>
<td></td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>.9</td>
<td></td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>1.0</td>
<td></td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

* in one firm, the interest charges were not available, it was therefore excluded from the analysis.
(4) Asset Values

The measurement of $X_3$, the break-up basis of valuation of the principal assets of the corporations presents severe difficulties. The net realisable value (N.R.V.) is not reported upon by companies as a matter of course. The actual values available were based on the historic cost concept and are, therefore, of little use for purposes of testing the exploratory model.

The basic means by which an N.R.V. would be arrived at in practice would be dependent on the number of alternative ways in which the assets could be used. Assets which are highly specialised and specific to a given organisation or industry might be expected to have low (or even negligible) N.R.V.'s. On the other hand, assets which have a wide variety of uses and which can be utilised (or adapted for use) by a wide range of organisations and industries, might expect to have relatively high N.R.V.'s. In this way, it might be expected that the 'industry-specific' nature of railway locomotives and rolling stock would result in low N.R.V.'s.

Indeed, in the event of the liquidation of the typical state railway, as the single operator in a given country, there is unlikely to be a potential purchaser of its principal assets who would use them for operational purposes. Therefore, in this case, such assets might

---

25 Although it has been suggested that such values should be regularly reported upon (see, for example, Lee (op.cit., 1980)) this represents a minority opinion which has not, as yet, influenced financial reporting practices.
have little more than scrap values. However, this is less likely to apply in the privately-owned railways, as numerous other railways might be interested in acquiring the assets of liquidated companies, for operational purposes. Therefore, it might be expected that, in the North American situation, railway locomotives would realise more than scrap values. Similarly, the assets of the private sector corporations included in this study might be expected to have net realisable values in excess of scrap values, in the event of liquidation. Thus, the principal assets of a given corporation within the textiles, stores or building industries are not so highly specialised that their usefulness is confined to that corporation. Other firms within each of these industries might make use of the assets of a liquidated firm in its industry. Furthermore, such assets (shops, warehouses, factories, for example) might be converted to other uses, making them attractive to an even wider range of potential purchasers.

Therefore, in general, it might be expected that the principal assets of state railway operating companies (i.e. locomotives and rolling stock) might be expected to have negligible values. On the other hand, the principal assets of private sector enterprises (including private railways) might be expected to realise values in excess of scrap proceeds. However, the exact values which might be attributed to the differing assets of these organisations is a matter of speculation, unless a major exercise is undertaken to obtain independent valuations of such assets. This would entail considerable expense and is outwith the scope of this study. Therefore, as the precise estimation of the
N.R.V.'s of the principal assets of all the corporations included in this study is not a practicable proposition, $X_3$ was entered as a dummy variable. Thus, for those corporations (i.e. private sector enterprises and private railways) which might expect to have relatively high N.R.V.'s from their assets on liquidation, $X_3$ was set at 1; for those (i.e. state railways) with lower expected N.R.V.'s, $X_3$ was set at 0. This is consistent with the hypotheses set out above, in which a corporation with a high financial leverage might also be expected to have a high N.R.V. (i.e. asset cover) for its investors.

(iii) Preliminary results

A cautionary observation must be made before considering the results obtained. Specifically, it is important to bear in mind that limitations were encountered regarding both the precise specification of the exploratory model and the nature of the data utilised in testing it. These limitations were discussed above and will not be repeated here. However, it must be stressed that the model is an exploratory one and, therefore, the following results are tentative. The strength of the findings obtained are assessed below in the context of the three hypotheses made. Thus, it was hypothesised that:

26 An exception to this was Canadian National, Canada's state railway company, which had $X_3$ set at 1. This was on the grounds that, not only are there numerous other railway companies on the North American continent, but they all share a common gauge of track, thereby increasing the likelihood that a potential purchaser might pay more than the scrap value of its assets in the event of its liquidation.
(1) the financial leverages of state railways would not be related to their level of business risk (H01),

(2) the financial leverages of private sector railways would be related to their level of business risk (H02),

(3) the financial leverages of other private sector enterprises would be related to their level of business risk (H03).

Therefore, negative findings were expected in testing the model on state railways. However, its exploratory nature weakens any inference that the financial leverages of state industries should be altered on the basis of such findings alone. Thus, H02 and H03 represent yardsticks by which the explanatory powers of the exploratory model might be verified. These matters are discussed below, in two stages:

(a) the results, and

(b) the robustness of the exploratory model.

Part (a) outlines the overall performance of the model and highlights distinctive aspects of the results obtained for each of the independent variables comprising 'business risk'. In part (b), an examination is made of statistical phenomena which might have distorted the results obtained.

(a) The results

The results obtained are shown in tables 10.7(a) to 10.9. Table 10.7(a) has the results of all state railways; table 10.7(b) refers to state railways, less those with exceptionally high financial leverages; table 10.8 details the results of privately-owned railways; and table 10.9 sets out the results of other private sector enterprises. The overriding
Table 10.7(a)  Regression Results: State Railways

<table>
<thead>
<tr>
<th>Definition of $X_1$</th>
<th>Definition of $X_2$</th>
<th>Working Capital Ratio</th>
<th>Quick Ratio</th>
<th>Operational Net Cash Flow/Interest Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$a$</td>
<td>$b$</td>
<td>$c$</td>
</tr>
<tr>
<td>1. E.B.I.T. (n = 28)</td>
<td>$0.58$</td>
<td>$-3.01$</td>
<td>$-0.1$</td>
<td>$-23.9$</td>
</tr>
<tr>
<td>t-statistic</td>
<td>-</td>
<td>$1.0$</td>
<td>$3.18$</td>
<td>$1.85$</td>
</tr>
<tr>
<td>F-statistic</td>
<td>-</td>
<td>$1.0$</td>
<td>$0.1$</td>
<td>$3.43$</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. R.O.F.A. (n = 25)</td>
<td>$0.56$</td>
<td>$-0.96$</td>
<td>$-0.25$</td>
<td>$-23.3$</td>
</tr>
<tr>
<td>t-statistic</td>
<td>-</td>
<td>$42.9$</td>
<td>$7.7$</td>
<td>$1.75$</td>
</tr>
<tr>
<td>F-statistic</td>
<td>-</td>
<td>$0.19$</td>
<td>$0.59$</td>
<td>$3.1$</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td></td>
<td>$1.63$</td>
</tr>
</tbody>
</table>

statistically significant at:  * the .10 level  
** the .05 level  
**** the .001 level
### Table 10.7(b) Regression Results: State Railways (Excluding High Leverages)

<table>
<thead>
<tr>
<th>Definition of $X_2$</th>
<th>Working Capital Ratio</th>
<th>Quick Ratio</th>
<th>Operational Net Cash Flow/Interest Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
</tr>
<tr>
<td>---------------------</td>
<td>----</td>
<td>-----</td>
<td>------</td>
</tr>
<tr>
<td>1. E.B.I.T. (n = 22)</td>
<td>.26</td>
<td>-.46</td>
<td>.27</td>
</tr>
<tr>
<td>t-statistic</td>
<td></td>
<td></td>
<td>.58</td>
</tr>
<tr>
<td>F-statistic</td>
<td></td>
<td></td>
<td>.33</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td>1.94</td>
</tr>
<tr>
<td>2. R.O.F.A. (n = 20)</td>
<td>.33</td>
<td>-.16</td>
<td>.13</td>
</tr>
<tr>
<td>t-statistic</td>
<td></td>
<td></td>
<td>8.0</td>
</tr>
<tr>
<td>F-statistic</td>
<td></td>
<td></td>
<td>.57</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td></td>
<td></td>
<td>1.62</td>
</tr>
</tbody>
</table>

Statistically significant at:

* the .10 level
** the .05 level
*** the .001 level
Table 10.8  Regression Results: Private Railways

<table>
<thead>
<tr>
<th>Definition of $X_2$</th>
<th>Working Capital Ratio</th>
<th>Quick Ratio</th>
<th>Operational Net Cash Flow/Interest Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a  b  c  d  R²</td>
<td>a  b  c  d  R²</td>
<td>a  b  c  d  R²</td>
</tr>
<tr>
<td>1. E.B.I.T.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 22)</td>
<td>.60 -1.48 -.51 1.75</td>
<td>.71 -1.36 -.32 7.19</td>
<td>.69 -3.37 -2.04 8.97</td>
</tr>
<tr>
<td>t-statistic</td>
<td>- .28 7.39 .07</td>
<td>- .28 1.45 .31</td>
<td>- .71 1.27 .37</td>
</tr>
<tr>
<td>F-statistic</td>
<td>- .08 .53 .01</td>
<td>- .08 2.02 .10</td>
<td>- .50 1.60 .14</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td>1.52</td>
<td>1.26</td>
<td>1.28</td>
</tr>
<tr>
<td>2. R.O.F.A.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 11)</td>
<td>.52 .94 -.51 6.14</td>
<td>.64 .83 -.32 11.1</td>
<td>.58 .52 -1.82 13.7</td>
</tr>
<tr>
<td>t-statistic</td>
<td>- **** 7.7 .26</td>
<td>- **** 1.44 .50</td>
<td>- **** 21.5 1.03 .57</td>
</tr>
<tr>
<td>F-statistic</td>
<td>- .15 .60 .07</td>
<td>- .14 2.1 .25</td>
<td>- .05 1.07 .32</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td>1.73</td>
<td>2.06</td>
<td>1.68</td>
</tr>
</tbody>
</table>

Statistically significant at: * the .10 level
**** the .001 level
Table 10.9  Regression Results: Total Private Sector

<table>
<thead>
<tr>
<th>Definition of X₂</th>
<th>Working Capital Ratio</th>
<th>Quick Ratio</th>
<th>Operational Net Cash Flow/Interest Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
</tr>
<tr>
<td>1. E.B.I.T. (n = 120)</td>
<td>.15</td>
<td>.15</td>
<td>-.77</td>
</tr>
<tr>
<td>t-statistic</td>
<td>-</td>
<td>.25</td>
<td>***</td>
</tr>
<tr>
<td>F-statistic</td>
<td>-</td>
<td>.06</td>
<td>.02</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td>1.94</td>
<td>1.93</td>
<td>1.97</td>
</tr>
<tr>
<td>2. R.O.F.A. (n = 120)</td>
<td>.14</td>
<td>.32</td>
<td>-.98</td>
</tr>
<tr>
<td>t-statistic</td>
<td>-</td>
<td>92.5</td>
<td>***</td>
</tr>
<tr>
<td>F-statistic</td>
<td>-</td>
<td>.86</td>
<td>.03</td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td>1.93</td>
<td>1.92</td>
<td>1.96</td>
</tr>
</tbody>
</table>

Statistically significant at: * the .10 level  ** the .05 level  **** the .001 level
aspect of the results contained in these tables is the poor explanatory power of the model. Thus the goodness of fit (as measured by $R^2$) is disappointing in each version of the model, for all sets of data (i.e. state rail, private rail and other private sector corporations) which were tested. Therefore, while the low values for $R^2$ in tables 10.7(a) and 10.7(b) are consistent with H01, they cannot be taken as acceptance of that hypothesis, given the limited support obtained for H02 and H03. Also, there are contradictory results in the point estimates of the coefficients for the independent variables; $X_1$ (variability of profits); $X_2$ (the threat of liquidation); and $X_3$ (the N.R.V. of principal assets); which further undermine the results obtained.

As regards $X_1$, it was expected that the estimates of this coefficient would typically be negative (i.e. high financial leverage and low variability of profits, and vice-versa), large and statistically significant. In the case of the state railways, this is not the case (tables 10.7(a) and 10.7(b)). However, the negative relationship of their financial leverages and the variability of their earnings is inconsistent with H01, in which it was hypothesised that their institutionally-determined financial leverages would be insensitive to 'riskiness'. However, this finding is not verified by reference to the analysis of private sector enterprises. Thus, for private railways, the R.O.F.A. measure of $X_1$ suggests that their financial leverages are not explained by the variability of their profits, but the E.B.I.T. measure contradicts this (table 10.8). Also the results for other private
sector enterprises are not convincing. Thus, while these are positive estimates, thereby suggesting that financial leverages are not related to variability profits, it is noteworthy that these are very small coefficients. This suggests that, if the variability of profits is a factor in determining the financial leverage of private corporations, it is not a very important factor. Overall, however, these results must be interpreted with caution.\footnote{27}

Secondly, the importance of $X_2$, the 'threat of liquidation' is somewhat dubious. The magnitudes of the point estimates of the coefficient are typically very small. There are instances of statistically significant estimates, but these have low or negligible values. Furthermore, somewhat contradictory results were also found for this variable. Thus, for state railways, the point estimates of the coefficient are all negative, implying that their financial

\footnote{27 It was noted above, in the discussion of how best to measure $X_1$ (the variability of profits) that the effects of inflation might result in a continual increase in the reported earnings of corporations, such that the standard deviation (and, therefore, the coefficient of variation) would be distorted. In this context, it was noted that 'stores' was the industrial classification most affected by this problem and that this was confined to the E.B.I.T. variable in ten corporations. In fact, a disaggregation of the private sector results shows results for R.O.F.A. which are both highly significant in statistical terms and correspond closely to the values obtained in the aggregate results for the private sector. This contrasts with E.B.I.T., in those versions of the model in which $X_2$ is measured by the Working Capital Ratio and O.N.C.F./Interest charges, in which negative point estimates were obtained for the b coefficient. However, these were neither very large, nor were they statistically significant.}
leverages are too high, in relation to the threat of liquidation. However, when those state railways with exceptionally high financial leverages are excluded from the analysis, modest, positive estimates of the c coefficient are found. This suggests that it is those state industries with exceptionally high financial leverages which are 'at risk'.

However, this interpretation does not receive unequivocal support from the results for private railways and other private sector enterprises. Thus, in private railways and other private sector enterprises there are point estimates of the b coefficient which are negative. This implies an inverse (but weak) relationship between financial leverages and their security from the threat of liquidation. This is liable to mean different things for these different industrial groupings. For example, in private railways, the threat of liquidation might be uncomfortably high, relative to their higher financial leverages. On the other hand, the private sector industries appear to be relatively safe from the 'threat of liquidation', as measured by \( X_2 \), but appear not to have taken advantage of this by 'trading on their equity', and raising more debt.\(^{28}\)

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\(^{28}\) It is possible, of course, that the impact of the 'threat of liquidation', as measured by all three indicators selected, is understated. In particular, this might be because of the use of an indicator based on operational cash flow [i.e. O.N.C.F./interest charges] in relation to other indicators which are based on allocated data, such as E.B.I.T. and R.O.F.A. This might be improved upon by using an alternative measure, such as O.N.C.F./Debt (see T.A. Lee, 1982, op.cit.). Indeed, it is possible that this latter indicator might be used, in its own right, as a device for ranking the riskiness of corporations (Lee, op.cit.).
Finally, the third independent variable, $X_3$ (the net realisable value of principal assets held) also exerts an uneven influence on these results. Thus, point estimates of the $d$ coefficient are large, negative and statistically significant for state railways (see table 10.7(a)). This is consistent with H01, in which it was expected that the financial leverages of state industries would not be related to their riskiness (as measured by asset cover, in this instance), for institutional reasons. This receives further support from the results for private railways. In table 10.8, there are large, positive (although not statistically significant) point estimates of the $d$ coefficient, thereby implying that their financial leverages are related to the security of the assets held. This is consistent with H02.

However, both of these results are confounded by those obtained for other private sector enterprises, as reported in table 10.9. This table shows point estimates of the $d$ coefficient which are large, negative and statistically significant. All of this contradicts the findings regarding H01 and H02. It might be explained by an insensitivity in the capital markets to the value of a given corporation's principal assets as a form of security. Given the lack of generally available information on N.R.V.'s, this must be more than simply a plausible explanation. Nevertheless, it must be borne in mind that this variable could not be measured with precision. Therefore, such conclusions regarding the working of the capital market can only be seen as tentative.
(b) The robustness of the model

The previous section has outlined the (disappointing) results obtained for the exploratory model. This failure of the model has been attributed to model specification and the nature of the data utilised to test it. However, in any regression analysis, it is possible that certain well-known statistical phenomena might have distorted such results. These stem from assumptions inherent in the regression model. This section briefly outlines the nature of such phenomena and then details the investigations taken to determine if they were present or not in this analysis. The findings obtained are of importance in confirming (or rejecting) the interpretation of the results set out in the previous section. They also provide insights into the behaviour of the exploratory model which could be of use in the specification of a refined version.

These phenomena might be classified into two broad groupings:

1. those affecting the relationships of the independent variables and
2. those related to the behaviour of the residuals, e_i. Under category (1), an investigation was made of the existence of multicollinearity (i.e. the presence of intercorrelations between the independent variables). The presence of multicollinearity weakens the significance of the estimates of the coefficients of the independent variables. However, as noted below, there is no evidence of it exerting a substantive influence on the results of this study. Also, within category (2), two different aspects of the behaviour of residuals were investigated - heteroscedasticity (unequal variances of the e_i) and
autocorrelation (where the disturbance term, $e_i$, of a given observation is influenced by that of another observation). The presence of either or both of these phenomena makes the results obtained for the usual t and F tests of statistical significance suspect. However, as shown below, there was no substantive evidence of such influences distorting the results obtained.

(1) Multicollinearity

The regression model assumes that there is no multicollinearity. If there is multicollinearity within the results, the regression coefficients cannot be estimated with precision, as the influence of the $X_i$ cannot be efficiently disentangled. Assuming the model is well specified, the existence of multicollinearity is essentially a sampling phenomenon, relating to the particular data collected for a given regression. As such, some degree of multicollinearity might be expected in many studies, i.e. its seriousness becomes a matter of degree, rather than one of absence or presence. Furthermore it has long been suggested that there can be multicollinearity between the types of accounting ratios used in this study (Horrigan, 1965). However, in the specification of this model great care was taken to isolate those accounting ratios which might be expected to be highly correlated, such that they entered the model as alternative measures of the different $X_i$ (for example, the use of E.B.I.T. and R.O.F.A. as alternative measures of $X_1$). Thus the $X_i$ constitute quite separate and different attributes of riskiness. Nevertheless, the existence of
some degree of multicollinearity can still be found in regression models, regardless of the care taken to isolate variables which appear to be independent of one another. However, there is no evidence of any substantial multicollinearity in the results of this regression model.

Thus, there is no single run where $R^2$ is sufficiently high (from, say, .7 to 1.0) to suggest multicollinearity. Also, there is no marked indication of the familiar evidence of multicollinearity in which $R^2$ is not only relatively high, but there are also no statistically significant results for the $X_i$ (as measured by the t test), implying that two or more $X_i$ constitute a single independent variable. Thus, the t-statistic is statistically significant from zero for the coefficients of the $X_i$ in most results (see tables 10.7(a) to 10.9). Further evidence of the absence of significant multicollinearity is contained in table 10.10, which sets out the Pearson product moment correlations between the independent variables. This reveals that these are generally low (i.e. <.50) for most versions of the regression model. Specific exceptions to this can be seen between E.B.I.T. and Working Capital for Stores (at -.50); between R.O.F.A. and Quick Ratio for State Railways (at -.56) and between Operational Net Cash Flow/Interest Charges to Net Realisable Value for textiles (at .58). However, these particular correlations are not very high. Furthermore, there is no systematic single relationship which is repeated for the various segments of the data, implying that there is therefore no consistent distortion of results because of multicollinearity. Nevertheless, in a regression model such as this, which has more than two independent variables, the
Table 10.10 Correlations of Independent Variables

<table>
<thead>
<tr>
<th></th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Working Capital</td>
<td>Quick Ratio</td>
<td>O.N.C.F./ N.R.V.</td>
</tr>
<tr>
<td>E.B.I.T.</td>
<td>(State Rail</td>
<td>.33</td>
<td>.38</td>
</tr>
<tr>
<td></td>
<td>(Private Rail</td>
<td>.32</td>
<td>.15</td>
</tr>
<tr>
<td></td>
<td>(Textiles</td>
<td>.24</td>
<td>-.02</td>
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<td>(Building</td>
<td>-.10</td>
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<td>(Store</td>
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<tr>
<td></td>
<td>(Private Sector</td>
<td>-.03</td>
<td>-.14</td>
</tr>
<tr>
<td>R.O.F.A.</td>
<td>(State Rail</td>
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<td>-.56</td>
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<tr>
<td></td>
<td>(Private Rail</td>
<td>-.28</td>
<td>-.23</td>
</tr>
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<td></td>
<td>(Textiles</td>
<td>.19</td>
<td>.42</td>
</tr>
<tr>
<td></td>
<td>(Building</td>
<td>.03</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>(Store</td>
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existence of low zero-order correlations does not totally eliminate the possibilities of multicollinearity. Under these circumstances, the partial correlation coefficients, in which all the independent variables are taken account of in their computation, are useful indicators of the presence or absence of multicollinearity. Thus, where $R^2$ is high and partial correlation coefficients are low, there is an implication that the individual independent variables selected do not offer important contributions to the explanation of the level of the dependent variable on their own, but that their combination or regrouping might successfully eliminate multicollinearity and explain a high $R^2$. However, as noted above, the $R^2$ results are not high. Not only that, but the partial correlation coefficients of the dependent and independent variables exhibit similar magnitudes for each of the coefficients to those in the regression results, for all versions of the model. Therefore, it does indeed seem unlikely that multicollinearity has distorted the results obtained.

(2) Heteroscedasticity and autocorrelation

The first important assumption of the regression model regarding the residuals or disturbances, $e_i$, is that they are homoscedastic, i.e. they all have the same variance. If the $e_i$ are heteroscedastic, the coefficients of the variables in the regression results are not affected to the extent they will remain unbiased and consistent, but their efficiency is impaired. Thus the variances of the coefficients of these variables will not be at a minimum in small as well as large samples.
As a consequence, the usual t and F tests in small samples (such as those in this study) are likely to exaggerate levels of statistical significance. However, the results of the regression model suggest that there are no significantly unequal variances among the disturbances, $e_i$. A visual inspection of graphs of the independent variable, $Y_i$, and the squared residuals (for all versions of the regression model) reveals no discernible relationship between them. Given this lack of any systematic relationship, it appears that there is a relative lack of distortions in the model from such disturbances, which strengthens the confidence in the regression coefficients computed.

A further assumption of regression models concerning the residuals is that of the absence of autocorrelation, i.e. the disturbance term, $e_i$, of any given observation is not influenced by that of another observation. This is most frequently considered in the context of time series analyses, in which it is important that, for any given observation, the value selected has not been influenced by that of a prior period. However, autocorrelation might also exist in cross-section data (i.e. correlation between observations in space). It is also particularly appropriate to test for this phenomenon in this study, in which a time series of a given variable (e.g. financial leverage) is represented by its mean score for the period selected. This averaging can introduce a smoothness into the data dampening the fluctuations of the raw data. This very 'smoothness' may lead to a systematic pattern in the disturbances, thereby introducing
autocorrelation. However, available evidence suggests that this treatment of the data did not introduce autocorrelation in the regression results obtained.

Thus, in most versions of the regression model, the Durbin-Watson statistic approximates 2 (see tables 10.7(a) to 10.9). This implies that there is no first order autocorrelation present. There are two exceptions to this: (i) tables 10.7(a) and (b), depicting the results for state railways and (ii) table 10.8 which sets out the results for private railways. In (i), there are three low Durbin-Watson results (all of which measure $X_1$, as R.O.F.A.): two in which $X_2$, liquidity, is measured by working capital (Durbin-Watson = 1.63 (table 10.7(a)); = 1.62 (table 10.7(b)); and one in which $X_2$ is measured by O.N.C.F./Interest Charges (Durbin-Watson = 1.68). In the first two of these, it is possible to reject (at the .05 level) the existence of negative autocorrelation; as regards positive autocorrelation, this lies in the indecisive zone of the Durbin-Watson statistic. As for the second, it is possible to reject (at the .05 level) the existence of both positive and negative autocorrelation for state railways. As regards (ii) above, private railways, there are three low Durbin-Watson results, all of which relate to the E.B.I.T. variable in table 10.8, encompassing all three measures of liquidity. These Durbin-Watson statistics, as shown in table 10.8, are 1.52 (with Working Capital Ratio as $X_2$); 1.26 (with Quick Ratio as $X_2$); 1.28 (with Operational Net Cash Flow/Interest Charges as $X_2$). In all three of these cases, the existence of negative autocorrelation can be rejected (at the .05 level)
for all three variables. Also, all three fall within the inconclusive zone regarding the existence or otherwise of positive autocorrelation. Finally, no substantive inferences can be drawn from the Durbin-Watson results displayed in table 10.8 in the case of the R.O.F.A. measure of X₁ for private sector railways, as the statistical significance of groups of data in which n < 15 is not meaningful. Overall, however, there is no indication of autocorrelation present. Given that this is so, the regression coefficients and the t and F tests of significance can be interpreted with confidence.

In conclusion, these tests suggest that the regression coefficients and the t and F tests of significance can be interpreted with confidence. Therefore, any improvement of the explanatory power of the model must come from a revised specification and/or different data for testing. These issues are taken up in the following section, which summarises the aims of this chapter, the problems involved and the results obtained, but also points up directions for future research.

CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

The fundamental aim of the analysis presented in this chapter was to determine whether risk capital should be introduced into the reconstructed railway operating company, as envisaged in Part II of this thesis. This aim presented numerous difficulties. In particular, the fact that state railway companies do not already have equity stakes
(with share prices) severely constrained the nature of the analysis. This meant that the market model of share price behaviour could not be utilised to determine the riskiness of state railways, such as B.R.

As an alternative, an exploratory model was devised which stemmed from the qualitative assessment of business risk in Chapters 7 to 9. This model sought to explain the relationship of financial leverage to business risk. However, this model was also constrained by the absence of market prices in the measurement of financial leverage. Also, the measurement of business risk was made difficult by its different nature in the public and private sectors. Furthermore, difficulties were encountered in the empirical testing of the exploratory model. This was based on a comparative financial analysis in which three distinctive groups were identified: (a) state railways, (b) private railways and (c) other private sector corporations. Within group (a), a further sub-group of state corporations (including B.R.) with exceptionally high financial leverages was identified. Each of these groups was assessed separately using the exploratory model. However, the results obtained were disappointing. The hypotheses devised were tested in two stages: (1) it was expected that the financial leverages of state railways would not be explained by their 'riskiness', and (2) it was expected that the financial leverages of private railways and other private sector corporations would be explained by their 'riskiness'. The empirical evidence was supportive of (1), but there was no confirmation of the model's explanatory powers from the results in part (2).
Nevertheless, there are numerous possible means by which future research might improve upon the exploratory model utilised in this chapter. Indeed, the preliminary results obtained above provide guidelines on the directions in which refinements might be necessary. The principal result of the regression analysis was a set of low values for $R^2$. Thus, the independent variables ($X_1$, variability of profits; $X_2$, the 'threat of liquidation'; and $X_3$, the N.R.V. of the principal assets of corporations) did not adequately explain the financial risk (as measured by financial leverage) of the corporations included in this study. This suggests that the model might be improved upon by the modification and/or the extension of the variables in the model and/or the elimination of limitations in the data used in the analysis. The need for future research to take this direction was also confirmed by further statistical analysis. This showed that the preliminary results were not affected by statistical phenomena (multicollinearity, heteroscedasticity and autocorrelation) which frequently distort the results of regression analysis - thereby underlining the need for modification of the model and/or the data utilised for testing.

Such modifications to the existing analysis might be categorised as follows: (a) attempts to mollify or eliminate limitations of the data; (b) refinements to the existing version of the model which are restricted to the use of nominal values and accounting data in the measurement of variables; and (c) the introduction of market measures. Each of these possibilities is explored, in turn, below.
(a) Limitations of the data

In the first instance, it was noted above that the private sector industries (textiles, buildings and stores) did not represent a random sample of private sector corporations and that, therefore, the findings of this analysis could not be extended beyond the industries in this study. Therefore, one possible refinement would be the replacement of these specific industries with a random sample of corporations quoted on the Stock Exchange. Another possible refinement, in a similar vein, would be the extension of the number of industries included in the analysis.

Secondly, changes might be made to the data utilised to analyse the riskiness of railway companies. A major problem mentioned above was the extent to which the railroads might be regarded as a homogeneous group. This reservation did not apply to private sector railways, a distinctive group of North American railways, which were analysed separately. However, within the state railways, more meaningful results might be obtained if the small, non-European countries were excluded from the analysis. This exclusion would be made on the grounds that the role of railway transport is liable to be fundamentally different in these countries from that of advanced economies, in which inter-modal competition might be expected to be fiercer.

(b) Revision of the existing model

The revision of the existing model might take two forms: (1) minor modification of the explanatory variables and (2) an extension of the
explanatory variables which draws on the qualitative assessment of risk in Chapters 7 to 9.

As regards (1), the earnings figures used for $X_1$, the variability of profits, might be adjusted for the effects of inflation.\(^{29}\) Also, the $X_1$ measure might be replaced by breaking down the variability of earnings into its constituent elements. That is, by the introduction of measures of sales volatility and operating leverage. However, the measurement of this latter aspect is troublesome, as corporations do not typically report upon the fixed and variable components of operating costs. A similar extension of the existing model would be the replacement of the dummy variable for $X_3$, the N.R.V. of assets, by more precise measures. This might be attempted, for example, by compiling a survey of the expected value of the major assets of corporations included in the study, in the event of their orderly disposal. However, the confidential nature of such information might confound this particular approach.

As regards (2), the qualitative assessment of business risk in Chapters 7 to 9, certain aspects of the riskiness of British Rail were discovered. However, these are not unique to British Rail and could be incorporated in a general analysis of the riskiness of state and private corporations.

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\(^{29}\) This is not a straightforward affair. The most evident way of adjusting for inflation is to deflate reported results by the retail price index. However, the relevance and accuracy of such an adjustment is a highly contentious matter. More sophisticated attempts at the revision of past financial results for inflation would require greater details of the asset structures of the firms concerned than is available from the data sources upon which this analysis is based. Even if such data were available, a non-controversial, inflation-adjusted statement of earnings is not guaranteed, given the necessary reliance on available indices and the length of time period involved.
Thus, for example, the type of market pressures isolated in Chapter 7 might be incorporated in a revised model. This would identify the nature of operating revenues for a given corporation, highlighting those aspects of revenue which are dependent on a small number of principal customers and/or are affected by fluctuations in the level of economic activity. Similarly, variables might be incorporated which sought to measure the impact of labour relations on financial importance. For example, a variable which permitted a ranking of corporations on the basis of the incidence of industrial disputes and/or other forms of poor industrial relations, such as low labour productivity (i.e. those issues uncovered in Chapter 8).

Finally, an attempt might be made to make the financial results of state railways comparable to those of private sector institutions by incorporating the effects of the types of Government intervention identified in Chapter 9. This last aspect is a significantly more difficult task than the incorporation of the impact of market pressures and industrial relations.

If the extension of the data utilised for testing purposes and the abovementioned modifications of the existing version of the model still produced poor results, it would be necessary to consider the introduction of market measures.

(c) Market measures

The most evident such refinement, in the case of private sector corporations, would be the substitution of market values for nominal values in the measurement of financial leverage (i.e. for private
railways and whatever private corporations are included in the analysis). If this version of the model still produced poor results, some refinement of the definition of business risk would be necessary.

If financial leverage is measured by market values, the $X_2$ and $X_3$ variables might be omitted from the analysis, on the grounds that there is evidence (as noted in the main text above) which suggests that the market adjusts share prices to reflect impending corporate failure. Similarly, $X_1$, the variability of profits (or sales volatility plus operating leverages) might be modified where market values of financial leverage are used. Specifically, the ability of the market-place to behave in a dynamic fashion, by anticipating a given corporation's earnings, might be introduced. Thus, for example, the first differences in the earnings of corporations (i.e. earnings at $t$, less earnings at $t-1$) might be related to the market values of financial leverages at time $t$.\footnote{After Goneedes, N.J., "Evidence on the Information Content of Accounting Numbers: Accounting-Based and Market-Based Estimates of Systematic Risk", \textit{Journal of Financial and Quantitative Analysis}, June, 1973.}

An alternative, somewhat similar, approach would be the use of the rate of growth of earnings as a measure of $X_1$.\footnote{This was proposed in the context of divisions of major corporations, but is clearly pertinent to corporations in their entirety. After Gordon, M.J., and P.J. Halpern, "Cost of Capital for a Division of a Firm", \textit{Journal of Finance}, September, 1974.}

While this approach might very well improve the explanatory powers of the model, its relevance to the issue of whether equity capital should...
be introduced at the reconstructed B.R. (or some other state railway) might appear to be limited. However, it might assist by providing a yardstick against which the explanatory powers of earlier versions (i.e. using nominal values and accounting data) of the model might be assessed. Thus, if it provides similar levels of explanation to those obtained by the use of earlier versions of the model (in which book values and accounting data were used) this strengthens the validity of inferences which might be drawn from the use of these earlier versions in relation to state railways. On the other hand, if there are significant differences in the explanatory powers of market-based and accounting-based regression models, this may prove to present intractable problems.

In this latter circumstance, the only possible means of obtaining remotely comparable measures for state railways would be the introduction of the market value of overseas borrowings and the market value of government stock, as quoted on the Stock Exchange, for the nominal values of the debt raised from the National Loans Fund by B.R. This would provide a 'market' measure of financial leverage. The major defect of this approach is that the stock market's price for government stocks is based on the security of government investment, in toto. It might therefore appear to be of questionable value to the specific circumstances of B.R. However, in practice, if B.R. did raise debt on the Stock Exchange (as it did before 1956, as discussed in Chapter 1) with a Government guarantee, the market is liable to treat this as another form of Government debt, just as it did in the 1950's. Nevertheless, the tentative nature of such an approach must be stressed.
Furthermore, while the logical outcome of the failure of the abovementioned modifications (regarding changes in data and refinements of accounting-based revisions of the existing model) is the consideration of the (potentially intractable) introduction of market measures, it is by no means certain that these accounting-based revisions will provide poor results. This has yet to be determined. Consideration of whether such refinements do or do not improve the explanatory powers of the existing model represents a major research project, in its own right. It is outwith the scope of the present study. However, it is the intention of the author to undertake such research by the pursuit of the types of modifications of both the data and the model, as set out above.
Chapter 11
SUMMARY AND CONCLUSIONS

This thesis examined the issue of whether B.R. should be allowed some measure of risk capital, whether Public Dividend Capital (P.D.C.) or equity. Three determinants of the provision of risk capital, of either type, were identified:

1. The existence of a profitable opportunity.

2. The relevance of the profit objective.

3. Exposure to business risk.

However, each of these determinants represents a major policy issue, in its own right. Thus, the viability of B.R. has been at the forefront of the debate on U.K. transport policy for many years. This was discussed within determinant 1 above. Similarly, the second determinant, the means by which B.R. has been, and should be, regulated, is also a matter of considerable concern to policy-makers.
Finally, the discussion of B.R.'s exposure to business risk is also a matter of considerable interest to policy-makers. This entailed a discussion of the nature of B.R.'s markets, its industrial relations and its relationships with Government. Therefore, while these three aspects of B.R.'s operations might be seen as comprising the set of criteria by which the decisions to introduce risk capital or not should be made, it must be remembered that each part of this thesis has its own particular relevance to policy-makers.

1. A PROFITABLE OPPORTUNITY

As regards 1., the possibility that the railway operating services (the carriage of freight and passengers) might be segregated from railway infrastructure (permanent way, signalling facilities) was examined as a prospective, profitable opportunity. There were two strands to this analysis.

In the first instance, it was shown that the absence of some system of road pricing is highly likely to distort the allocation of resources to, and the volume of use of, the road and rail networks. In particular, this is because the absence of a pricing signal for
road use means that existing and potential road users perceive this to be a 'free good'. This phenomenon has been advanced by a number of writers as a reason for the subsidisation of railway infrastructure (but not for the operating services). However, a major difficulty with such subsidisation is that, in an integrated railway company, there is potential for management to hide operational inefficiencies and financial deficits with infrastructure subsidies. Therefore, this is one reason for their segregation.

A second reason which has been advanced for the segregation of railway operating services and infrastructure is that, in general, the operating services and infrastructure are alleged to exhibit fundamental differences, such that operating services typically exist in a competitive environment and infrastructure exhibits powerful monopoly tendencies. Thus, as regards the operating services, these are said to employ principal assets which are relatively inexpensive, have short lives and no indivisibilities. All of this facilitates ease of entry, and of exit, to and from such industries. On the other hand, infrastructure assets are alleged to be relatively expensive, have long lives and have significant indivisibilities. These characteristics present entry barriers and inhibit competition.

However, while the rationale for such a dichotomy was readily established, it was not possible to test the validity of this dichotomy by direct reference to existing market structures. These do confirm the competitive: monopoly dichotomy to a large degree, but the non-commercial operation of roads constrains this conclusion. An
examination of the contributory factors to this dichotomy upheld the differences between these two aspects of transport systems for asset lives, capital costs and technical indivisibility. However, the existence or otherwise of economies of scale proved to be more difficult. This was partly because of the relative neglect of the issue of economies of scale for infrastructure and partly because studies of economies of scale in railways were based on the existing, integrated form of railway organisation. Nevertheless, it was shown that for the non-rail operating services there is no substantive evidence of economies of scale. Also, while there was less evidence available on infrastructure, it did suggest that there are economies of scale in this aspect of transport systems. Finally, a re-examination of studies of economies of scale at railways revealed that these were most likely to be associated with railway infrastructure rather than railway operating services.

Therefore, overall, a possible 'profitable opportunity' (viz. the reconstructed railway operating services) was identified.

2. THE RELEVANCE OF THE PROFIT OBJECTIVE

While the reconstructed railway operating services might be considered to be a 'profitable opportunity', there remains the issue of whether it is appropriate for it to have a profit objective or not. This is particularly the case with the possible introduction of P.D.C., as state industries might be expected to have wider objectives than narrow financial ones. Therefore this problem was tackled by:
(i) An examination of the existing machinery for regulating state industries to determine whether they did indeed have quite different objectives from private sector enterprises.

(ii) A consideration of the scope for possible radical alternatives to narrow financial objectives for the reconstructed railway operating services.

(i) The existing machinery of regulation

The status quo was examined, in the first instance, by a consideration of the policy arrangements made for the regulation of these industries. These arrangements are embodied in three White Papers - Cmnd. 1337 (1961), Cmnd. 3437 (1967), and Cmnd. 7131 (1978).

It was noted in this discussion that, despite competing viewpoints on whether financial discipline should or should not be a major feature of the regulation of these industries, the financial yardstick dominated all of these schemes of regulation, whether by intention or by default.

Thus, the 1961 White Paper introduced the notion of financial discipline and affirmed that nationalised industries should have specific profit targets and, in any event, should not incur financial deficits. The major competing influence was that of welfare economists, who sought to impose a system of financial regulation which emphasised the efficient allocation of resources, with the consequent possible neglect of financial discipline. In particular, this possibility existed because of their advocacy of marginal cost pricing, when combined with a situation of decreasing total costs as output is expanded. This latter phenomenon is alleged to characterise many
major nationalised industries, including B.R. However, it was shown in chapter 3 that the advocacy of marginal cost pricing is surrounded by confusion, with differences of viewpoints between its principal proponents, interpreters of official policy and, indeed, in the practice of official policy. The end result was the effective restoration of financial objectives as the dominant means of regulating these industries. The 1978 White Paper saw the reintroduction of financial objectives as a major aim, in which state industries were generally expected to earn a specified minimum rate of return. However, implicit in this approach, was the desire to integrate the economist's notions of optimal resource allocation with the accountant's emphasis on financial discipline. Nevertheless, it was suggested that the complete integration of these differing views is not feasible and that financial objectives and discipline are likely to continue to dominate the regulation of these industries.

Furthermore, the importance of financial discipline was further stressed by an examination of the experiences of B.R. since nationalisation. This revealed that, at three critical phases in the life of B.R., its reported financial results served as a trigger for policy initiatives which led to reconstructions, all of which were aimed at the creation of a profitable, viable railway.

(ii) 'Radical alternatives'

However, while chapters 3 and 4 established the importance of financial objectives to existing state industries (including B.R.),
they did not eliminate the prospect of such objectives being supplanted by radical alternatives.

The most evident possible radical alternative is that of 'social profit or loss', in which a divergence between private and social costs and benefits might result in state industries being directed to maximise net social benefits, regardless of financial deficits incurred. Indeed, this argument has been used as a defence of B.R.'s existing deficits, on the grounds that its reported financial deficits (and any social costs) are exceeded by social benefits. However, in chapter 5, it was noted that the measurement of net social benefits represented little more than a theoretical ideal. Furthermore, it was shown that, not only are social costs of railways slight, but that the major social benefit derived from railways is related to the infrastructure, not the operating services. On this basis, a financial objective, such as a minimum rate of return, would not be inappropriate for the 'state railway operating company'.

A further alternative, that of non-financial indicators, has increasingly come to the fore as a possible means of regulating these industries. An extreme interpretation of this approach might result in the maximisation of a non-financial objective to the detriment of the viability of a given industry. However, on closer inspection, this, too, seems an unlikely alternative to financial objectives. Indeed, it is most likely to be used as a supplement to financial objectives and only under limited circumstances.
Three possible interpretations of this approach to the regulation of the reconstructed railway operating services were investigated: (a) productive efficiency, (b) quality of service measures and (c) volume of service constraints. In the 'productive efficiency' and the 'quality of service' options, the volume and depth of information required to effectively implement such policies would undermine management by effectively involving the regulatory authority in operational decisions. Furthermore, the rationale of all three measures was that of regulation of monopoly (whether state-owned or not) to prevent the exploitation of monopoly power by providing an inadequate quality or volume of service or by passing on productive inefficiencies in inflated prices. However, such considerations only seemed likely to apply to one segment of the reconstructed railway operating services. In this instance, the third option, 'volume of service constraints', might be applied to prevent excess profits being earned by that segment of the railway operating services. This would both retain the integrity of these services as a commercial entity and place a restriction on (but not an elimination of) profits for such services.

Overall, therefore, the challenge of radically different objectives for the reconstructed railway operating services (to the detriment of the existing style of financial objectives) seems unfounded. On this basis, assuming that the railway operating company does indeed represent a 'profitable opportunity', there might be a case for risk capital (whether P.D.C. or equity) to be introduced.
3. **THE EXISTENCE OF BUSINESS RISK**

The 'riskiness' of railway operating services was assessed in both qualitative and quantitative terms. The qualitative assessment was primarily directed at testing the applicability of P.D.C. to the proposed reconstructed railway services. This analysis was based on the contents of B.R.'s Annual Reports, to determine its perception of its risk environment. Therefore, the experiences of B.R. served as a proxy for the proposed railway operating company.

Three major themes were identified in this analysis: (a) market pressures, (b) labour relations and (c) relationships with Government. The first of these examined the influences operating on B.R.'s attempts to generate revenue. As regards freight, two major elements of business risk were identified, viz., B.R.'s reliance on a small number of specialist industries and the cyclical fluctuations of the level of activity in these industries. Also it was shown that passenger services typically operate in highly competitive conditions. Within the second theme, labour relations, there were findings which were supportive of the existence of business risk at B.R. Thus, on industrial action, there was evidence of both internal and external disputes. More important than this, however, was the inability of management to secure increases in productivity. Resistance to such changes by organised labour was of particular significance, as labour costs represent its most significant operating cost. The third theme identified, relations with Government, also revealed elements of business risk. The variability of B.R.'s reported financial results
was exacerbated by the delays and refusal of price increases, particularly where this arose as a result of informal pressure. Also, such intervention on B.R.'s investment policies would have had a similar, but less immediate, effect on its reported financial results. Overall, therefore, this analysis suggested that B.R. had experienced risky operating conditions and, on these grounds, a reconstructed state railway operating company might therefore be justified in receiving some element of P.D.C.

The second, quantitative, assessment of the existence of business risk at B.R. was based on a comparative financial analysis of state railways, private sector railways and other private sector enterprises. This was aimed at discovering the relevance of the introduction of a private equity stake in the reconstructed railway operating company. However, the very fact that B.R. already does not have such finance inhibited the testing of its applicability. This was one of a number of difficulties encountered in this quantitative assessment of business risk. These difficulties were sufficiently severe to make the approach adopted experimental. Thus, there were difficulties over the data utilised in the study. In particular, the homogeneity of the 'state railway' classification was a matter of serious doubt. Also, in this, a preliminary study, the private sector companies included did not represent a random sample of all such companies quoted on the Stock Exchange. Therefore, strictly speaking, the results could not be extended beyond those industries included in the analysis.
However, a more fundamental problem was that of specifying a model which allowed a comparative assessment of the riskiness of state railways with that of private railways and other private sector enterprises. The single most important difficulty was the absence of market measures of risk for state railways. There was a consequent need to devise an accounting-based model which adequately permitted both the measurement of risk and its effective comparison between private and public sector corporations. The difficulties involved in such an exercise cannot be overstated. Nevertheless, in this preliminary analysis an exploratory model was constructed, tested and suggestions were made on its future improvement. As for the actual results achieved by the exploratory model, these were inconclusive. Therefore, while, on the one hand, the possibility of introducing a private equity stake in the reconstructed railway operating company is not ruled out by this analysis, on the other, no evidence is offered in support of its introduction.

OVERALL CONCLUSION

In conclusion, the conditions set for the introduction of risk capital do apply:

1. There is a prospective profitable opportunity, in the shape of the reconstructed, railway operating services.
2. Furthermore, radical alternatives to financial objectives would not be applicable to the railway operating company, as it would have no significant divergence between its private and social costs and benefits.

3. Finally, there is evidence that the reconstructed railway operating company would be exposed to business risk.

Thus, there is a case for the introduction of risk capital at the proposed railway operating company. However, this thesis has not sought to specify which form of risk capital, P.D.C. or equity, would be most appropriate. Indeed, while the empirical evidence on business risk is stronger for P.D.C. than for equity, the exploratory nature of the model used to test for the equity alternative must be borne in mind. Therefore, the decision as to which form of risk capital might be introduced in such a scheme of reconstruction is properly one for policy-makers.
BIBLIOGRAPHY


Berelson, B., Content Analysis in Communication Research, Free Press, 1952.


Central Statistical Office, Economic Trends, H.M.S.O.

Chadwick, E., "Results of Different Principles of Legislation and Administration in Europe; of Competition for the Field, as compared with Competition within the Field of Service", Journal of the Royal Statistical Society, Vol.22, 1859, pp.381-420.


Department of Trade, Future Civil Aviation Policy, Cmnd. 6400, H.M.S.O., 1976.


Galt, W., Railway Reform: Its Importance and Practicability Considered as Affecting the Nation, the Shareholders, and Government, Longman, Green, Longman, Roberts and Green (London), 1865.


Klein, L.R., A Textbook of Econometrics, Row Peterson & Co., 1953.

Knight, F.H., Risk, Uncertainty and Profit, Houghton and Mifflin, 1921.


Leitch Report, Advisory Committee on Trunk Road Assessment, Department of Transport, H.M.S.O., 1977.


Mance, H.O., The Road and Rail Transport Problem, Pitman, 1940.


National Coal Board, Annual Report and Accounts, 1975-76.


Nationalised Industries, Background Papers 1 (Financial Analysis), 4 (Manpower and Pay Trends), and 5 (Price Behaviour), N.E.D.O., 1977.


Polanyi, G. and P., Failing the Nation: The Record of the Nationalised Industries, Fraser and Ansbacher, 1974.


Royal Commission on Trade Unions and Employers' Associations (Donovan Report), June, 1968, Cmnd. 3623.


Tanner, J.C., An Economic Comparison of Motorways with Two and Three Lanes in Each Direction, Transport and Road Research Laboratory, L.R.203, 1968.


INCOME MEASUREMENT AT A STATE RAILWAY CORPORATION: THE 'SOCIAL PROFIT' ILLUSION?

Irvine Lapsley*

The issue of whether it is desirable, or feasible, to replace the present accounting measure of profit or loss in British Rail (BR) accounts with a measure of 'social profit or loss' is discussed within this paper. It is a matter of considerable controversy. The debate surrounding this controversy is outlined below. This is followed by an appraisal of the potential for the measurement of 'social profit or loss' at BR in two stages: (a) an 'ideal' concept of social surplus and (b) a more pragmatic version which is compatible with existing accounting approaches. 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 reports, as essential criteria to ensure the credibility of BR's reported results.

It is shown below that the concept of 'social profit or loss' espoused by the critics of accounting profit or loss is indeed illusory. In fact, suitable modifications to existing measures of profit or loss are shown to be the best means of accounting for BR's 'social obligations'. This finding is of general significance, as the possibility of devising a measure of 'social profit or loss' is greater for BR than for most other corporations, whether public or private sector, given the disproportionate amount of research activity aimed at the measurement of external effects in the transport sector in the 1960's and 1970's (e.g. Foster and Beesley, 1963; Ministry of Transport, 1969; Roskill, 1971). Therefore, its successful measurement would have placed BR in the vanguard of the impetus for such measures; its failure makes the likelihood of devising such measures for other industries remote, at least in the foreseeable future.

Accounting Profit v 'Social' Profit

At present, 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 (Lapsley, 1981a). This has led to criticisms of BR (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

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argues that such criticisms are misleading, because accounting 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, BR 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. Indeed, when the Minister of Transport introduced the Bill for the 1974 Railways Act, he cited these reasons as justification for describing BR as being a unique (emphasis added) form of public corporation. 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 accounting 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 BR, which has not only criticised the usefulness of its profit or loss because of the incidence of externalities (BR, 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 (BR, 1976a, 1977). Indeed, a former chairman of BR has suggested that, under such a system, BR'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).

The Measurement of 'Social Profit or Loss': (1) A Theoretical Ideal

Three, quite distinct, views are prevalent regarding the treatment of externalities: (a) the creation of property rights (favoured by the Austrian 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 affects 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 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 BR'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), Ys, of BR's activities, where, for illustrative purposes, private and social costs and benefits are segregated:

\[ C + (K_{t1} + K'_t1) - (K_{t0} + K'_t0) \]

where

- \( C \) = the maximum possible consumption consistent with the maintenance of capital.
- \( K_{t1} \) = the value of expected net private benefits from BR's operations at time \( t_1 \),
- \( K_{t0} \) = the value of expected net private benefits from BR's operations at time \( t_0 \),
- \( K'_t1 \) = the value of expected net social benefits from BR's operations at time \( t_1 \),
- \( K'_t0 \) = the value of expected net social benefits from BR's operations at time \( t_0 \).

This is the familiar economists' concept of income, plus the addition of a measure of BR's 'contribution to society', as expressed by its external costs and benefits (\( K'_t1 - K'_t0 \)). 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.

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However, the magnitude of these estimation problems is further increased if the measure of \( (K^t_{t1} - K^t_{t0}) \) is introduced. 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. 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 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 reporting procedures 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 reports is examined in the following section.

The Measurement of 'Social Profit or Loss': (2) 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 BR's profit and loss account might serve as an adequate approximation to the full cost (i.e. both private and social) of BR's operations. This is supported by statistical evidence which suggests BR'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, it is shown (contrary to the viewpoint of Nove) that the greatest potential for their measurement lies with
the retention of the present status of BR as a commercial organisation. Suitable modifications to the existing measure of profit or loss can then be made to provide an approximation to BR's total (i.e. private and social) benefits. Its combination with BR's private costs (which approximate to both private and social costs) therefore provides a measure of 'social profit or loss' which conforms to existing criteria of objectivity and verifiability in income measurement.

**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 BR as being of most relevance to its operations (BR, 1976a; BR, 1976b), specifically, (i) the use of scarce energy resources (ii) the creation of noise and (iii) causing serious injury and loss of life. Statistical evidence suggests that these social costs are slight for BR. Also, they pose considerable measurement problems. These difficulties can conveniently be examined by classifying the above mentioned social costs as 'consumer' and 'producer' effects. The use of scarce energy resources by BR 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.

(a) **Social Costs: BR 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 author'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: BR as a Producer**

As for BR's other social costs, attempts have been made to devise measures

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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 and p.143) has argued that the price system is capable of fully reflecting noise in the 'market for quiet', as expressed by changes in property values.10 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 BR'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 reports, where an annual measure of (presumed) loss of welfare would be necessary for BR'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.

This leaves the social cost of serious injuries and loss of life sustained through BR'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 earnings) and what he/she would have consumed. A major difficulty with this

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valued their protective role. The value of the consumption saved, which includes housewives, schoolchildren, pensioners, the permanently disabled. If these categories of victims formed the main components of BR's occasional travellers involved in serious accidents, BR 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 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 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:

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

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 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 ex post accounting measures.

In sum, of the social costs which BR 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 BR'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 BR’s operations (i.e. private costs do approximate to social costs).

**Social Benefits**

There are two basic categories of social benefit at BR: (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 must be expressed as to whether these aspects of having railway services can genuinely be classified as ‘social benefits’. Also, it is shown that, while the second category does indeed constitute an external benefit, the magnitude of this social benefit is indeterminate other than as a theoretical ideal or by political processes.

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.\(^\text{11}\) The identification, measurement and evaluation of these benefits derived from the railways can be achieved by a re-examination of the nature of BR 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 their government departments and Ministers advising them on their ‘wider obligations’ (social benefits), on the other hand, is central to this policy. Nove’s proposals would involve a devolution in the 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 BR’s financial reports 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.\(^\text{12}\) 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 £644.8 million in 1975 and 1976 for its entire passenger services. Other nationalised industries have also received such payments.\textsuperscript{13} 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 \textit{specific} guidance, which sets out the reasons for the direction and the additional costs which would be incurred by the industry in its implementation.\textsuperscript{14} 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 reports.

As an example of how this might operate, consider the possibility that BR’s labour force might be higher than BR 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 of their employment to the economy would be zero.\textsuperscript{15} A suitable approach to the payment of this compensation would be a transfer to BR 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 costs of these Ministerial directives are compensated by government. This has the benefit of segregating those elements of BR’s operating costs which are controllable, consequently providing a better yardstick of accountability for both BR and the Government. This approach also meets the criteria of providing objectively prepared, verifiable accounting information. This is 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 \textit{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 \textit{were} designed to redistribute income to BR customers they would be entirely inappropriate. As BR’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, 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 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 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 (HM Treasury (1978) p.22, para 54).

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 BR’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. In this respect, the maintenance of the rail network might confer 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 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 both relieve urban traffic congestion and maintain rail transport links with outlying regions.

There are two aspects of this failure of the price mechanism. In the first instance, all forms of infrastructure for transport (airports, seaports, railway permanent way) have prices associated with their use, with the exception of roads. 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 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.

Furthermore, the price mechanism also operates unevenly with regard to the use of transport services, as distinct from the use of transport infrastructure. The most immediate benefit offered by transport services — time savings — can be reflected, up to a point, within the existing price structure in the market-place.
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 added for such items as superior comfort (first v second class travel), different times of travel (peak v off peak). However, for the motorist, not only is there no explicit price for the use of the road system, but also the other costs associated with the 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,\(^1\) with no price available as a basis of comparison between modes. For these reasons, any attempt to derive surrogate prices based on existing travelling habits is of dubious value.

The above mentioned attributes of motoring compound the possible distortions in the volume of road travel (vis-a-vis competing modes) which might be brought about by the absence of a price for the usage of roads. One possible solution to this would be the introduction of a system of road pricing, which 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. Thus, the existing, admittedly imperfect, administrative systems might be improved by the introduction of additional, quite different, taxes. 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. This 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, given the improbability of road pricing, or a satisfactory surrogate, being implemented, there remains the question of how to resolve the problem of allocating resources between modes. At present, this issue is addressed to the extent that the Government presumably recognises a failure of market forces and is prepared to subsidise railway operations. However, the political determination of the extent of such subsidisation has been criticised by Dodgson (1981) on the grounds that it is not known if it is actually merited. In his view, such political judgements should be set aside and the subsidy paid to the railways (or, indeed, to other transport operators) should equal the net social benefit derived (Dodgson, op. cit., pp.9, 10 and 14).

As a theoretical ideal, this cannot be denied. However, the issue of the subsidy paid to BR cannot be set aside from other public expenditure, as the act of subsidisation of one part of the public sector could lead to the displacement of some other, socially worthwhile, activity. As a consequence, there must be some
rationing of the alternatives for public expenditure. It is difficult to see how this can be achieved other than by political judgement. Even if it is assumed that an operational measure of 'social profit or loss' can be calculated for BR, it is not possible to apply cost-benefit analysis to the rest of the activities financed by public expenditure, nor even to the transport sector alone, with any confidence. At the level of the totality of public expenditure, the problems in measuring the net social benefit of activities such as health and education are significantly greater than those of transport.18

Furthermore, even if this approach is restricted to the transport sector alone, its potential is severely limited. In the first place, under these circumstances, there would be no elimination of the political process in determining the initial size of the transport budget. It could be argued, therefore, that it would be somewhat incongruous to apply the 'social surplus' criterion to intra-sectoral allocations of that (politically determined) share of public expenditure when it had not been applied to other aspects of public expenditure. Also, it is instructive to note the state of the art of cost-benefit analysis as applied to investment programmes for the roads. This is still in its infancy and is by no means a sophisticated application of the cost-benefit approach (Heggie, 1979). Therefore, its development and extension to the entire capital stock of roads presents a formidable challenge. Furthermore, even the most ardent of its advocates for transport investment has stressed the potential for sub-optimisation from cost-benefit analysis, on the grounds that a co-ordinated approach in its use is essential because of the systems effects of transport infrastructure (Georgi, 1973, p.8). Indeed, the present institutional arrangements for transport make the full scale adoption of the cost-benefit analysis approach unlikely. On the one hand, there is the fully integrated, commercially-operated BR; on the other, the Government (both central and local) responsible for infrastructure (i.e. roads) with a widely diffuse set of users of that infrastructure.

These reasons combine to inhibit the formal estimation (albeit on a partial basis, given that the size of the transport budget is necessarily politically determined) of the net social benefits of roads consistent with a 'social surplus' criterion for BR. One apparent solution to this is the creation of a Public Roads Authority. But this is an essential component of the scheme proposed by road pricing advocates which, if implemented, would effectively make the need to value the externalities of transport infrastructure by cost-benefit analysis redundant. In any event, it has been shown above that, even for BR alone, the 'social profit or loss' ideal is no more than that. Under these circumstances, the estimation of the net social benefit of railways, and, thereby, the appropriate subsidy for the rail network, is indeterminate, other than by political processes.19 Its accurate estimation would be best assisted by the introduction of a pricing system for roads. But, as noted above, this very act would effectively eliminate the need to introduce measures of 'social profit or loss', as the allocation of resources between modes would then be adequately resolved by market forces. As this particular policy is unlikely to be implemented, the size of this subsidy

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will 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 rail services.

Summary and Conclusion

A number of influences have suggested BR’s financial profit or loss is an inadequate measure of its contribution to society, (Government, academics, the industry itself). These pressures have pointed towards the need for the development of a measure of ‘social surplus or loss’ for BR. This paper has sought to answer the question of whether such a measure is illusory or not.

The ‘ideal’ measure of the net social benefits of BR’s operations might be conceptually appealing to some, but it is of little practical relevance. This suggests the concept of a measure of ‘social surplus’ for BR is illusory. However, by examining the external costs and benefits in a more pragmatic fashion, by abstracting from the fundamental difficulties of measurement posed by the ‘ideal’ measure of ‘social profit or loss’, a measure of BR’s contribution to society was found, which was consistent with existing financial reporting data. This rested on two issues: (a) the relative unimportance of BR’s social costs (regardless of their measurability) and the acceptance of BR’s private costs as an adequate approximation to them; (b) the retention of BR as a ‘commercial’ state enterprise, with explicit Ministerial intervention (with detailed assumptions and costings) where BR’s private costs conflicted with the net benefits conferred on society as a whole, as perceived by the Minister and Government. In this respect, subsidies received on this basis are rightly regarded as part of BR’s benefits. However, it is important to note that the major external benefit derived from BR relates to the provision of transport infrastructure and its precise measurement is not possible. Notwithstanding this reservation,\(^2\) if BR’s total private benefits and the proxy for its external benefits (as indicated by its subsidy) are not exceeded by our approximation to its total costs (private and social), the ‘social profit’ may not be an illusion.

NOTES

1 This refers to the measure currently advocated as ‘best commercial practice’, which subsumes a variety of possible methods of computation. Any discussion regarding the relative merits of such alternative methods is irrelevant here: the crucial issue is whether they might be supplanted by a radical alternative, the ‘social profit or loss’.

2 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 fact that

‘... 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...’ (p.1005, Parliamentary Debates (Hansard) 5th Series, Vol. 875, House of Commons, Session 1974).

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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.’ (p. 111, Hansard op. cit.)

3 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-a-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 BR’s contribution to society, or whether this is illusory.

4 It appears that these views are shared by other national railways, for example, those in South America (see Dodgson, 1981).

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

6 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 change, 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.

7 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 BR’s 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 the organisation where there exist consumers’ surpluses.

8 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 BR 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 (1977), 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 considered below in the discussion of the social benefits of railways. Nevertheless, the social costs reported upon by BR are consistent with the key external costs of transport, as identified in the literature (see, for example, Roskill, 1974; Independent Commission on Transport, 1974).

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 per cent of the road death toll in 1957. Similarly, for serious injuries per thousand million passenger miles travelled, rail travellers suffered, at worst, 6.25 per cent (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 per cent of the sample stated that they were disturbed at home by road traffic noise, but only 9 per cent and 5 per cent 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”, Cmd 2056, HMSO, 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, HMSO, 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 which are carried per mile, for a given amount of fuel compared to other modes (p.295, Independent Commission on Transport, op. cit.).

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.

For a lucid exposition of such effects, see Coombes (1971), particularly pp.35-53.

Para 37, p.14, Cmd 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, Cmd 1337, The Financial and Economic Obligations of the Nationalised Industries, 1961).

e.g. British Airways (as BOAC) 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 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).
This assumes that unemployment benefits approximately equal average wages paid to railway workers.

Although this is never made explicit in the case of the railways, because of the integrated nature of their operations.

It might be thought that the various user costs associated with the ownership and usage of vehicles do provide an adequate surrogate for a money price. However, it is evident that the indivisible nature of their payment is basically unrelated to vehicle use. Thus, of annual insurance premiums, half-yearly or yearly road fund taxation, servicing costs and the cost of fuel, only the latter might be perceived of as a "cost" associated with a given journey. However, unless motorists purchase the exact petrol requirement for a specific journey, the relationship of petrol costs and vehicle usage is not explicit enough to even constitute a partial money price.

As an example of such difficulties, consider the NHS. 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).

Within such processes, the lack of a measure of net social benefit for BR might be ameliorated by the use of non-financial proxies. For a discussion of this possibility, see Lapsley (1981b).

This lack of precision might be a source of critical comment. However, it is important to note that, by specifically addressing the major externality (i.e. whether or not to have a railway network, and what size this should be), this offers an improvement over previous systems such as deficit financing (1948 to 1967); partial attempts at measuring net social benefits of branch lines, which ignored systems effects (1968-1973); and the payment of lump sum subsidies in support of an unremunerative passenger system (1974 to date). The last means of subsidising does not distinguish between government intervention on "social obligations" and this genuine externality. Furthermore, as key decisions on transport provision have to be made in the meantime and no measure of the net social benefits of BR is available for the foreseeable future, such criticism is somewhat unfounded.

REFERENCES


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——— (1976b), *Environmental and Social Impact Study*.


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— (1975), The Transport Problem, (Croom Helm, 1975).


