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<https://doi.org/10.1111/j.1475-5890.2002.tb00069.x>

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Published paper

Pollitt M.G.; Smith, A.S.J. - 2002- *The Restructuring and Privatisation of British Rail: Was it Really that Bad?* - Fiscal Studies 23(4), pp.463-502

The Restructuring and Privatisation of British Rail: Was it really that bad?

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Abstract

This paper uses a social cost-benefit analysis (SCBA) framework to assess whether rail privatisation in Britain has produced savings in operating costs. The paper shows that major efficiencies have been achieved, consumers have benefited through lower prices, whilst the increased government subsidy has been largely recouped through privatisation proceeds. We also find that output quality is no lower (and is probably better) than under the counterfactual scenario of public ownership (pre-Hatfield). The achievement of further savings is key to delivering improved rail services in the future. This paper finds that a privatised structure, where shareholders demand a return on their investment, has led to significant improvements in operating efficiency - it remains to be seen whether the new regime, with a not-for-profit infrastructure owner, will deliver the same efficiency improvements.

JEL classification: H43, L92.

* Pollitt and Smith are both at the Judge Institute of Management, University of Cambridge. Smith is funded by the Railtrack Studentship in Rail Regulation. The authors wish to thank Luisa Affuso for kindly sharing data with us (data which was generated during a rail research project sponsored by the ESRC – grant number: R000237928). The authors also acknowledge comments from David Newbery, Luisa Affuso, Stephen Gibson and two anonymous referees. All remaining errors are the responsibility of the authors.

I: Introduction

Over the period 1994-1997 the British railway industry was fundamentally transformed. In 1994 the industry was in the hands of a single, vertically-integrated operator - British Rail - owned by the government. By 1997, BR's activities had been transferred to the private sector. In the process, the industry was restructured into more than one hundred companies, thereby removing much of the vertical and horizontal integration of the pre-privatisation structure.

Since its reorganisation, and subsequent transfer to the private sector, the rail industry's outputs have grown sharply. Between 1992/93 (the last year before restructuring began¹) and 1999/00, passenger miles and freight tonne-miles grew by 21% and 19% respectively, whilst train miles were also up significantly (passenger train miles grew by 13% over the period). During this same period, total industry operating costs² fell by nearly 6%, suggesting that significant efficiency improvements have been made.

However, the privatisation of British Rail has been the subject of much criticism in recent years, particularly in the aftermath of the Hatfield accident³. In October 2001 the Government announced that it had decided to put Railtrack into administration – with the company to be replaced by a not-for-profit company, limited by guarantee. Railtrack's finances had been crippled by the cost of Hatfield, and cost over-runs on the West Coast Main Line project⁴.

¹ See Section III.2 (a).

² Operating costs (excluding depreciation).

³ A train derailment resulting from defective track, which resulted in four people being killed.

⁴ The renewal and enhancement of Britain's West Coast Main Line (linking London and Glasgow in Scotland).

In the aftermath of the government's announcement, attention has focused on what went wrong with privatisation, and how crucial investment for maintenance and development of the network will be financed in future. This paper looks at whether the restructuring and privatisation of British Rail has produced savings in operating costs, relative to the counterfactual scenario of continued public ownership. Operating costs include train operator costs (train crews; traction costs; maintenance and cleaning of rolling stock), the cost of operating the rail network (including signal operators), and day-to-day track maintenance and inspections. The analysis excludes capital and depreciation costs, and therefore excludes the cost of track (and other infrastructure) repairs and renewals, and the capital cost of rolling stock (see below). For the rest of the paper, unless otherwise stated, cost is taken to mean operating costs (excluding depreciation).

The paper uses the technique of social cost-benefit analysis (SCBA) – as developed by Jones, Tandon and Vogelsang (1990) – to evaluate the operating efficiency gains (or losses) resulting from privatisation, and also considers the allocation of these gains (or losses) between consumers, producers and government. The analysis assumes the growth in outputs achieved in recent years to be exogenous, and therefore focuses on the cost of delivering these outputs under the alternative scenarios of private and public ownership. The paper also looks at the changes in output quality (performance; overcrowding; asset condition; safety) since privatisation. Whilst capital is excluded from the social cost benefit analysis (due to the problem of establishing a counterfactual scenario), we provide separate evidence on railway capital investment before and after privatisation.

The analysis uses data for the period to 1999/00 (financial year) only, and therefore does not take account of the effects of Hatfield. The next financial year (2000/01), which

includes the Hatfield accident, is not representative of the period since privatisation as a whole (and not all of the financial data are available in any case). Indeed, the effects of Hatfield continued into the financial year 2001/02. The analysis should be updated once data become fully available for three further years (2000/01, 2001/02 and 2002/03).

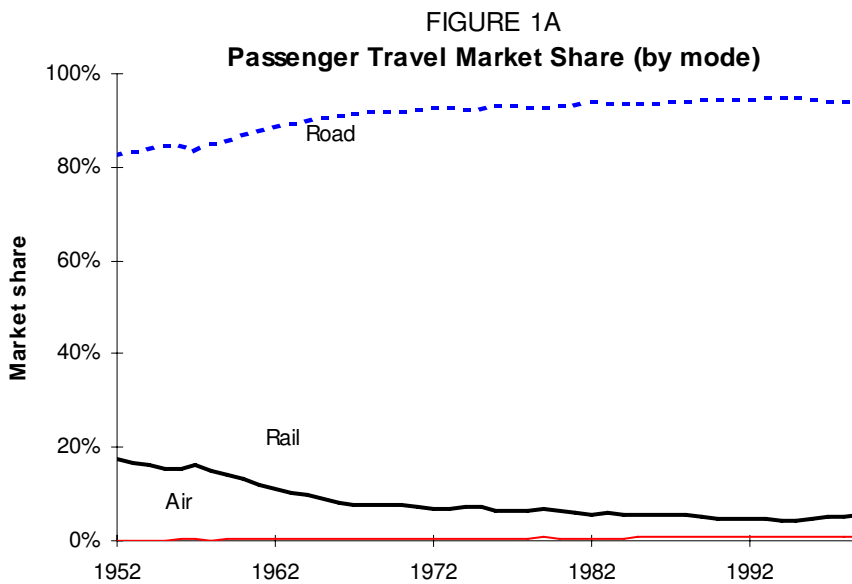
It should be noted that the change in industry structure means that it is not straightforward to compare railway costs before and after privatisation. Our analysis makes a number of adjustments to the data to ensure comparability. Inevitably a number of assumptions have also been made. These adjustments and assumptions are explained in the relevant section of the paper (and also in the appendices).

The SCBA methodology has previously been applied to a number of privatised industries in the UK, for example, electricity (Domah and Pollitt, 2001), and some of the earlier sell-offs (Galal et al, 1994; Martin and Parker, 1997). The paper is arranged into five sections. Section II briefly outlines the historical background. Section III summarises the theoretical arguments for liberalisation (restructuring and privatisation), and sets out the SCBA methodology and data used. Section IV shows the results of the analysis, and Section V offers some conclusions.

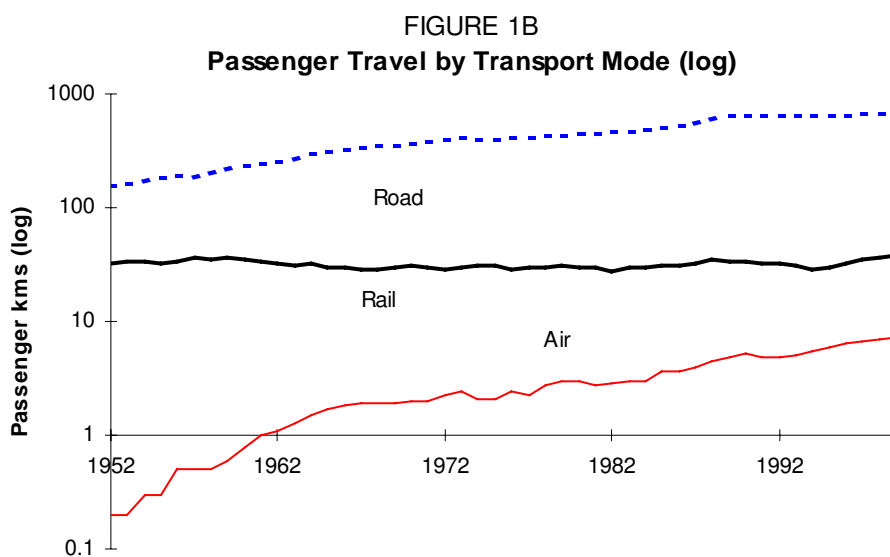
II. Historical background

The railway network in Britain was planned, financed and built by the private sector in the 19th Century. The industry was nationalised in 1948, and then returned to private ownership during the period 1995-1997, as part of the wider programme of sell-offs carried out by four successive Conservative administrations (1979-1997).

Since nationalisation, rail traffic has been in almost continual decline in the face of increased competition from road transport (see Figures 1A and 1B). In the early 1950s, passenger rail travel accounted for roughly 17% of total passenger traffic - by the mid-1990s this share had fallen to around 5%. Rail freight business saw an even sharper loss of market share, from over 40% to just 7% over the same period, driven by the loss of traffic to roads, and the decline of Britain's heavy manufacturing and primary industries (which rail freight was particularly well placed to serve). Rail volumes also fell in absolute terms up until the mid 1990s. As noted in the introduction, these trends have been reversed since privatisation⁵.



⁵ The upturn in the rail volumes began in 1995/96, one year before the industry had been fully privatised.



Sources: Transport Trends, 2001 Edition (DTLR).

The railways moved into a loss-making position in the mid-1950s and, in spite of the line and station closures implemented following the Beeching reports (1963; 1965) - which saw the total route mileage reduced by a third - the industry's financial position continued to deteriorate during the 1970s and early 1980s (as productivity growth slowed whilst wages were on the increase; and as government controls prevented the development of commercial pricing). The 1968 Transport Act explicitly recognised the need for government subsidy to support loss-making (but socially-beneficial) services. However, in line with worsening performance, the level of subsidy also increased over time, reaching £1.6bn by 1985/86, compared to £600m in 1968 (1999/00 prices).

During the 1980s it was recognised that the financial position of the industry, and the requirement for government support, would complicate any attempt at privatising the industry. Rail privatisation would require route closures and/or continued government

subsidy after sale. As a result, proposals for rail privatisation developed slowly during the 1980s, finally culminating in the sale of the industry during the period 1995-1997.

However, the government (and BR), were not idle in the meantime, and began selling off many of BR's non-core operations (see Table 1). Some of these sales raised substantial sums (for example, BR Hotels raised £150m in 1999/00 prices)⁶.

TABLE 1

BR Non-core Businesses Sold to the Private Sector (1981-1993)

BR Hovercraft (1981)	Doncaster Wagon Works (1987)
BR Hotels (1982-1984)	Horwich Foundry (1988)
Superbreak Mini Holidays (1983)	British Rail Engineering Ltd (1988)
Slateford Laundry (1983)	Travellers Fare [station catering] (1988)
Sealink UK (1984)	Transmark [consultancy] (1993)
British Transport Advertising (1987)	Meldon Quarry (1993)

Sources: Bradshaw and Lawton-Smith (p 104) and Freeman & Shaw (page 9).

The debate on privatising the core railway operations continued throughout the 1980s and early 1990s. In 1992, immediately following the surprise Conservative election victory, a White Paper, 'New Opportunities for the Railways' (Department of Transport), was quickly put together under the direction of the John MacGregor (then Secretary of State for Transport). The strong likelihood that the Conservatives would lose the subsequent election (1997) injected an urgency into the process, as the government sought to complete the sale of the industry in one Parliament – and thus make privatisation effectively irreversible.

⁶ Source: Public Enterprise Partnerships Team, HM Treasury.

The 1992 White Paper outlined the government's privatisation objectives, which were similar to those for previous sell-offs: to harness the skills of private sector management, in order to achieve greater responsiveness to customer needs, higher service quality, improved efficiency and better value for money. The introduction of competition was thought to be the best way of achieving these objectives (following the example of the electricity restructuring in 1990), although it was recognised that regulation would be required to protect consumers (especially with regard to safety).

As a result, the industry was separated (vertically and horizontally) into more than one hundred companies (see Figure 2 below), to allow competition to develop in the contestable elements of the business. The restructuring was carried out initially within the public sector, creating shadow companies, which were later sold.

The most significant change was the separation of control of the track infrastructure (natural monopoly) from train operation (contestable). In 1994, most of the fixed railway infrastructure assets were transferred to a new company, Railtrack, separate from BR, but still wholly-owned by Government. The company was sold by public offer in 1996⁷.

At the same time, BR's infrastructure services were reorganised into seven infrastructure maintenance and six track renewal companies (sold between February and July 1996). BR's rolling stock was divided into three leasing companies (ROSCOs). The ROSCOs (sold in January/February 1996) lease locomotives and carriages to the passenger train operating companies⁸. Six heavy maintenance depots (provide services to ROSCOs) were also sold in April and June 1995⁹.

⁷ See Kain (1998) page 248; NAO Report (HC 25 Session 1998-99) page 20.

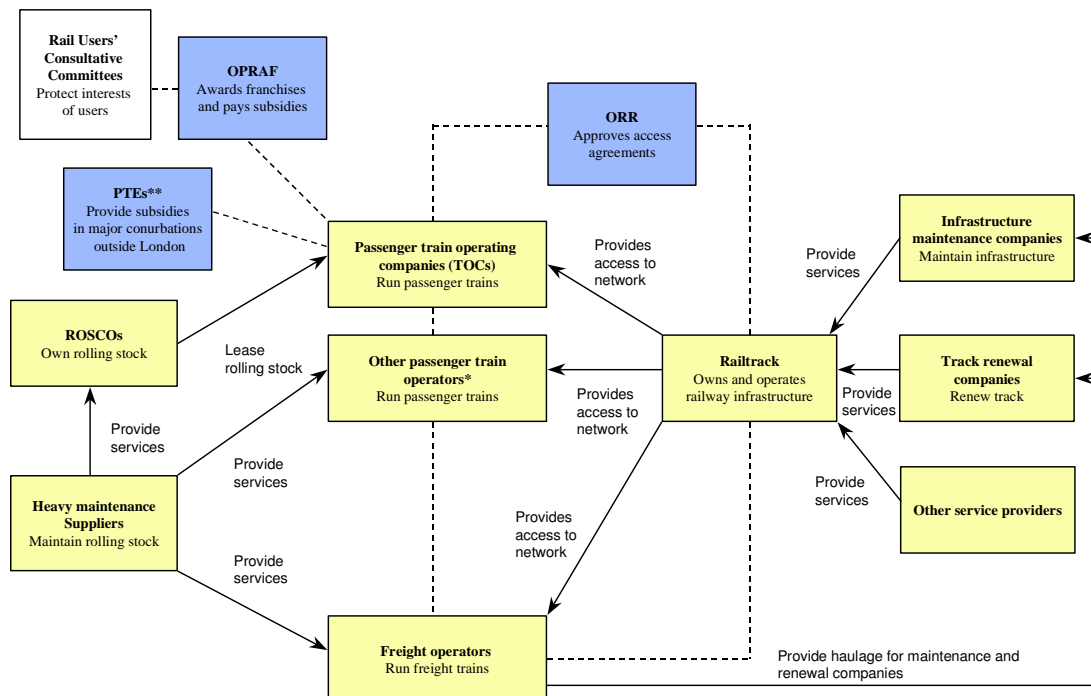
⁸ See NAO (HC 576 Session 1997-98) p 1.

⁹ See NAO (HC 25 Session 1998-99) page 22.

The right to run passenger train services was franchised to 25 private sector train operating companies (TOCs) - with open-access competition to be introduced gradually under the “moderation of competition” rules laid down by the Regulator (from 1995 onwards). TOCs lease almost all of their rolling stock from the ROSCOs, and pay Railtrack for access to track and stations. Red Star Parcels was sold to a management buy-out in September 1995¹⁰.

FIGURE 2

The New Rail Industry in 1996/97



Source: Railtrack Pathfinder Prospectus, page 21.

* Initial structure made some provision for open-access to develop in future. Heathrow Express and Eurostar currently operate on an open-access basis.
 ** PTE = Passenger Transport Executive

¹⁰ Provides rapid parcels distribution on passenger trains - see, Department of Transport, ‘New Opportunities for the Railways’ page 12; British Railway Board Accounts 1995/96.

Freight operations were separated into six companies (later consolidated into two) and sold between December 1995 and November 1997 (with open-access competition allowed from the outset). In addition, many other BR central services operations were sold to private sector companies or management teams¹¹.

As part of the reorganisation, two regulatory bodies were also created: (1) The Office of Rail Regulator (ORR), principally to regulate the monopoly element of the business - Railtrack; and (2) The Office of Passenger Rail Franchising (OPRAF), mainly responsible for awarding franchises, paying subsidies, and regulating the TOCs¹². Rail Users' Consultative Committees (RUCCs) were established to work with OPRAF in protecting the interests of rail users¹³. Safety regulation was placed with the Health & Safety Executive.

Having described the background to rail privatisation, the remainder of the paper concentrates on whether the new structure has met one of the government's main objectives – namely, improving operating efficiency - and how any efficiency gains (or losses) have been allocated between consumers, producers and government.

Since privatisation industry outputs have increased substantially (reversing a long-term trend of decline), whilst costs have fallen in real terms. The new structure gave the TOCs strong incentives to increase outputs and reduce costs (because of declining subsidies; fixed access charges). Whilst part of the output growth since the mid 1990s can be attributed to privatisation itself - through, for example, fare regulation and better marketing) - in the subsequent analysis (Section IV) we make the conservative

¹¹ See Kain (1998), page 250; Bradshaw and Lawton-Smith (2000), pages 108; 118; NAO Report 'The Sale of Railfreight Distribution'.

¹² John Swift (QC) and Roger Salmon were appointed as the first Rail Regulator and Franchising Director respectively (January 1993) - see Freeman & Shaw (2000), page 207.

assumption that output growth has been driven entirely by exogenous factors (eg. GDP growth; road congestion). This assumption reduces the benefits attributed to privatisation in our analysis.

Our analysis therefore focuses on whether the industry's outputs – driven by exogenous factors - would have been delivered more cheaply under the new structure than under continued public ownership. Data on output quality (performance; overcrowding; asset condition; safety) and capital costs are also evaluated. The new structure contained a number of features to ensure that efficiency gains would be shared with consumers (fare regulation; competition) and government (declining subsidy profile). The analysis in Section IV quantifies the allocation of efficiency gains (or losses) between the different groups.

III. Methodology

1. Theoretical issues and empirical work

The ideological belief underlying the privatisation of British Rail was that the injection of private sector expertise and flair would result in improved services, more efficient operations, and better value for money for the travelling public. It was also hoped that the private sector would be able to lure passengers and freight customers back to the railways (greater responsiveness to customer needs), and arrest the long-term decline of the industry.

¹³ See Freeman & Shaw (2000), p 33.

However, following earlier privatisations (eg. BT and British Gas), it was recognised that change in ownership alone would be insufficient to deliver the required improvements in services and cost. Whilst private ownership and the profit motive provide better incentives than public ownership, the government saw competition, and the ending of BR's monopoly, as key to delivering improvements on the railways.

The liberalisation of public enterprises in general often involves three separate, and not necessarily connected elements: changes in ownership; the creation of new, or radically restructured companies; and the introduction of some degree of competition. Depending on the combination of these factors, liberalisation will tend to cause significant changes in the way businesses are conducted. Pollitt (1997) identifies five theoretical arguments relating to the likely efficiency effects of liberalisation:

1. liberalisation can improve incentives by reallocating property rights from the public to the private sector;
2. liberalisation may change the objective functions of managers being faced with private sector incentives for the first time;
3. there may be incentives for distortionary resource allocation, caused by some types of regulation (eg. rate of return regulation) leading to inefficiency;
4. liberalisation may cause "influence activities" within the industry (eg. empire building), which may result in a divergence from efficiency; and
5. policy commitment theories suggest that liberalisation will result in lower intervention costs.

Pollitt (1997) notes that, in a developed, market economy such as the UK, the theoretical predictions provide some (weak) support for restructuring and privatisation in

the case of property rights, bureaucracy and commitment theories; but that poorly constructed incentive regulation could negate all the other positive benefits from liberalisation. As a result, the impact of any particular restructuring and privatisation process (in a given industry or country) has the potential to be highly variable.

A number of methodologies have been used to assess the impact of liberalisation, for example based on price or cost comparisons, as used by Yarrow (1992) and Bishop and Thompson (1992), or using simulation or frontier approaches, such as Burns and Weyman-Jones (1994). These methodologies have been criticised as they do not directly address the issue of whether it is likely to be socially beneficial (in particular they do not address the distributional effects of liberalisation).

A more comprehensive approach would be the computational general equilibrium (CGE) method (for example, Chisari, Estache and Romero, 1999), which assess the macroeconomic and distributional effects of privatisation and regulation. However, none of these approaches possess the power of an overall social cost-benefit analysis (outlined below), and are themselves based on numerous assumptions regarding specification of objectives and constraints.

SCBA studies, for example Galal et al (1994) and others (Newbery and Pollitt, 1997) have addressed the failures of the other methodologies. In this paper we use a SCBA framework to analyse the effect of liberalising Britain's railway industry.

2. The Social Cost-Benefit Methodology

The methodology developed by Jones, Tandon and Vogelsang is concerned first with assessing the total change in welfare resulting from privatisation and restructuring, and second with the allocation of this change, principally between three groups, consumers, producers (ie shareholders of the new, privatised companies), and government¹⁴. The first question relates to the productive efficiency impact (net of restructuring costs) of liberalisation, whilst the latter is concerned with equity. For simplicity our analysis ignores changes in allocative efficiency.

Jones et al define the privatisation decision according to the following formula:

$$\Delta W = V_{sp} - V_{sg} + (\lambda_g - \lambda_p) * Z$$

where: W = Social Welfare; V_{sp} = Social value of firm under private operation;
 V_{sg} = Social value of firm under continued government operation; Z = Price paid to buy the firm (or government sales proceeds) and λ_g and λ_p are the shadow multipliers on government revenue and private funds respectively.

Privatisation will be socially worthwhile if $\Delta W > 0$. In a developed, market economy, we would expect no significant difference in the value of shadow multipliers, so for the purpose of our analysis we set $\lambda_g = \lambda_p = 1$. The sales proceeds variable, Z , which is a

¹⁴ Jones et al also consider other parties, such as competitors and suppliers (often excluded from empirical applications of the methodology on practical grounds), and workers (often excluded on the grounds that any rents earned by employees are fully compensated through redundancy payments, which are included within the cost base of the companies concerned).

transfer payment between government and producers, therefore drops out of the equation (though remains important for its distributional effects).

The calculation of ΔW involves computing the difference between the costs under public and private ownership (both over the period since privatisation, and into the future). Costs under private ownership (to date) are based on actual data; and these also need to be projected into the future. However, the main difficulty lies in estimating what would have happened to costs under continued public ownership. In order to address this issue we need to build a counterfactual scenario based on historic and other economic data.

The efficiency savings due to liberalisation are calculated as the difference between the present value of actual (private) and counterfactual (continued public ownership) costs. Restructuring costs are then deducted, to arrive at the value of ΔW . The final step is to allocate ΔW between the three groups (consumers, producers, and government), and therefore to determine the winners and losers (see below).

(a) Comparing Costs with and without Privatisation

The first task is to decide on the cut-off point between public and private ownership. In this paper we take 1996/97 as the first full year of privatisation¹⁵. However, the last year of public ownership is taken to be 1992/93, since this is the last year unaffected by the

¹⁵ By 1996/97 the following parts of the industry had been sold: Railtrack (sold in May 1996); the three ROSCOs (sold in January/February 1996); thirteen infrastructure companies (sold between February and July 1996); six heavy maintenance depots (sold in April and June 1995); Red Star Parcels (sold in September 1995); the majority of the freight businesses (sold between December 1995 and May 1996, with the exception of Railfreight Distribution, which was not sold until November 1997). By the end of 1996/97, all of the 25 franchises had been let.

restructuring and privatisation programme¹⁶ (see below). The transition period (1993/94 to 1995/96) saw the restructuring of the industry and its transfer to private ownership.

The sale of British Rail was accompanied by a radical restructuring of the industry, to create more than one hundred new companies. As a result, computing the total (actual) rail industry cost since privatisation is not straightforward, given the number of companies involved, and the complex set of financial payments flowing between the companies. In addition, care is required in comparing cost data before and after privatisation.

It was not possible to calculate the post-privatisation cost base by adding up the costs of the constituent parts (and eliminating inter-company flows), as the data did not permit such an analysis. We get around this problem by deriving industry costs as the difference between total industry revenue received from final users (train operator revenue), less total industry operating profits (non-operating revenues, costs and profits are excluded from the analysis). The data are shown in Table 2, for the post-privatisation period (1996/97 to 1999/00). The data for earlier years are taken directly from BR Annual Reports.

The costs in Table 2 are operating costs (excluding depreciation). Whilst a full SCBA analysis would also include a consideration of capital costs, this paper focuses only on the operating side of the business. As stated in the introduction, capital is excluded from our analysis due to the difficulty of establishing a counterfactual. We note that it is common in railway efficiency studies to focus on operating costs, due to problems of capital measurement and comparability. However, this comes at a price, since operating

efficiency improvements may be mistaken for capital substitution effects; and capital expenditure also impacts on output quality. We present evidence to address both of these issues in Section IV.4.

A number of points are worth noting with regard to the data in Table 2. First, it excludes the costs of minor (open-access) freight operators (though these are small), thus underestimating post-privatisation costs slightly. On the other hand, the profit data in Table 2 do not reflect the returns made by the many supplier companies sold as part of the restructuring, who now provide services to the industry (therefore overstating the post-privatisation costs). ORR costs are charged out to the industry, so do not need to be added separately.

The costs of the Strategic Rail Authority are included in Table 2 (netted off against TOC profits) – though to the extent that the SRA, and its predecessor, OPRAF, were staffed through transfers from other parts of government, the inclusion of these costs may overstate costs under the privatisation scenario, relative to the counterfactual. Indeed, Department of Transport costs, which would have been considerably higher under the counterfactual, are not included in our analysis.

Residual BR costs have been excluded (these include policing costs, which are charged out to the industry)¹⁷. On balance, given the scale of some of the supplier contracts - for example, Railtrack spends roughly £1.3bn per year on contracts with infrastructure maintenance and renewal companies alone - we expect that the approach used overstates the post-privatisation costs overall, and therefore underestimates the

¹⁶ In 1993/94 a voluntary severance offer was announced, in preparation for changes in organisation and ownership, which led to over 7000 employees leaving the industry.

efficiency gains from privatisation. In their report for the ORR, Europe Economics (2000) note that anecdotal evidence points to substantial margins achieved by rail contractors. For further explanation of the costs in Table 2 see Appendix A.

For the counterfactual cost scenario, we have relied on historical data from BR's accounts. We started by reviewing the cost data for ten years prior to privatisation (1984/85 to 1993/94) – note that privatisation began in 1994/95 (eg. heavy maintenance depots were sold, and Railtrack was created as a separate company, within government). However, the final period chosen to inform the counterfactual was shortened to the five years (1988/89 to 1992/93) for the reasons outlined below. The use of five years pre-privatisation data is common in divestiture studies (see Galal et al, 1994).

The financial year 1993/94 was excluded from the pre-privatisation period – this year was significantly affected by the privatisation and restructuring programme, and saw a voluntary severance programme, in preparation for privatisation, which led to a 7% reduction in headcount in that year¹⁸. We note that it is common in privatisation studies to exclude the years immediately prior to privatisation (either to capture the effects of privatisation announcements on productivity growth; or because data for those years may be distorted by privatisation provisions)¹⁹.

¹⁷ BR residual costs also include some property costs (non-operational) and costs relating to liabilities relating to the pre-privatisation period. Further analysis may look at whether any of these costs should be added to the post-privatisation cost base.

¹⁸ In the Annual Report for 1993/94, this programme was specifically linked with privatisation. 1993/94 also saw a number of minor sell-offs (Transmark and Meldon Quarry).

¹⁹ See Galal et al (1994); Martin and Parker (1997); Newbery and Pollitt (1997).

TABLE 2
Rail Industry Costs (Computed as Revenue less Profit)

Rail Industry Costs £m, 99/00 prices ^a	Pre-privatisation					Transition ^g			Post-privatisation			
	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00
Passenger revenue ^b									5,220	5,223	5,180	5,150
Freight revenue ^c									607	573	555	601
Railtrack prop. income ^d									133	134	139	137
Total industry revenue (A)									5,960	5,930	5,874	5,888
TOC profits									24	181	162	164
Freight profits									52	87	82	68
ROSCO profits									1,035	1,064	1,054	1,028
Railtrack profits									533	528	483	473
Total profits (B)^e									1,644	1,860	1,781	1,733
Industry costs (A-B)	4,287	4,195	4,176	4,394	4,406	4,023	NA	NA	4,316	4,070	4,093	4,155
Passenger train miles (m)	222	225	232	231	228	228	222	231	229	237	249	257
Freight-tonne miles (bn)	11.2	10.4	9.9	9.5	9.6	8.6	8.1	8.3	9.4	10.5	10.8	11.4
Composite index^f	100	99	100	99	98	96	92	96	98	103	108	112

(a) Conversion uses RPI data. (b) Includes subsidies. TOCs only (excludes Heathrow Express and Eurostar). Financial data for 5 TOCs were not available for 1999/00 – data were extrapolated for these TOCs. (c) Includes EWS and Freightliner20. (d) That part of Railtrack's income which does not come from TOCs or freight operators (needs to be included for comparability with BR data). (e) Operating profits before depreciation, net of SRA/OPRAF costs; excludes non-operating profits, such as profits on asset sales. (f) Weighted index used to calculate unit costs (88/90 = 100). Weighted based on freight/passenger revenue. (g) It was not possible to construct comparable data for 94/95 and 95/96 due to restructuring.

Sources: BR Annual Reports; Annual Reports for individual companies (post privatisation). Transport Trends, 2001 Edition (DTLR).

²⁰ Data for Freightliner has been collected for 1998/99 and 1999/00 only – the data for 1996/97 and 1997/98 was extrapolated.

The data from 1984/85 to 1987/88 have also been excluded from the analysis. 1984/85 and 1985/86 was affected by the coal strike (see BR Annual Report, 1985/86). The data between 1986/87 and 1988/89 were impacted by the sale of a number of businesses, continuing a trend which started in the early 1980s (see Table 1). In particular, BR sold British Rail Engineering Ltd (BREL) and Travellers Fare (station catering). Whilst it is not possible to calculate the exact impact of these sales on BR's cost base, the sales of the two businesses led to a reduction in headcount by around 13,000 (or 8%) between 1987/88 and 1988/89.

Having established the appropriate time period for historical analysis, the counterfactual cost profile is then constructed based on the 1992/93 cost level, projected forward using an assumption about counterfactual efficiency gains (based on historical performance). The construction of the counterfactual cost scenario is described in detail in Section IV.1.

The calculation of a counterfactual cost profile, based on historic data, raises the question of whether the pre and post-privatisation cost data are comparable. The formation of Railtrack in 1994/95 saw a change in accounting policy through the introduction of the Asset Maintenance Plan Charge (AMP). This approach forecasts the required repairs and renewal activity for track, route structures, stations and depots over a ten year period, and charges one tenth of this estimate to the P&L in each year (as depreciation²¹).

However, we are satisfied that the data (pre and post privatisation) remain comparable, despite the change in policy. The main impact of the change was to

significantly increase depreciation costs (to address under-investment before privatisation, and to bring accounting policies into line with other regulated industries – see Appendix B). As noted already, depreciation costs are excluded from operating costs in our analysis. Furthermore, there is no evidence to suggest that the change resulted in any transfer of cost between operating costs and capex: the level of day-to-day infrastructure maintenance (the operating element of maintenance costs) increased in 1994/95, compared with the previous year²².

To complete the analysis, the SCBA approach requires projections of both the actual (privatised) and counterfactual (public ownership) costs into the future. For simplicity, we have assumed that no further savings are made after 1999/00, and that the efficiency gap opened up by the private sector is closed over the following fifteen years (that is, the public sector is assumed to catch up over time).

(b) The Efficiency Gains from Restructuring and Privatisation

The value of efficiency gains from privatisation and restructuring are simply calculated as the difference between the present value of the two cost profiles $C_g - C_p$ less the present value of restructuring and privatisation costs (R&P).

$$\Delta W = C_g - C_p - R\&P$$

²¹ From 1998/99 onwards the AMP charge formally became part of depreciation under FRS 15.

²² See BR and Railtrack Annual Reports for the relevant years.

The consumer surplus impact of higher traffic volumes is excluded from our calculation of ΔW , since volume growth is assumed to be exogenous. This is a simplifying assumption, made necessary by the difficulty of establishing how much of the traffic growth is due to privatisation versus other factors (such as the economic upturn). This assumption also reduces the benefits attributed to privatisation in our analysis.

Restructuring and privatisation costs are assumed to be zero under the counterfactual scenario. Under the privatisation scenario they include all R&P costs incurred within government (in 1993/94, 1994/95 and 1995/96), and all restructuring costs incurred since privatisation (1996/97 onwards, by the newly-privatised companies).

(c) Distribution of the Net Efficiency Gains

Once the present value of the net efficiency gains from privatisation has been calculated, the next step is to analyse its distribution between consumers, producers and government, as summarised in the following identity:

$$\Delta W = \Delta \text{Cust} + \Delta \text{Prod} + \Delta \text{Gov}$$

ΔCust is calculated as the difference between actual and counterfactual average revenue (price), multiplied by the actual volume. The price was computed using a composite volume index based on passenger miles and freight tonne-miles (weighted according to passenger and freight revenue). The counterfactual average revenue (price) projection was estimated by extrapolating the trend in average revenue for the five years

prior to privatisation (for simplicity we are ignoring the allocative efficiency aspect of any price changes).

The change in the government's position (ΔGov) is relatively complex, and includes a number of factors. First of all, by selling the industry the government foregoes any potential profit/(deficit) streams from the business in future, and in return receives the sales proceeds for the industry and a share of future profitability through corporation tax. In contrast to earlier privatisations, the government has also continued to provide ongoing revenue subsidies²³ to the sector since privatisation. The counterfactual scenario assumes that the government would continue to pay revenue subsidies to cover operating losses.

However, there is a further complication here. On privatisation, the government was relieved (to some extent²⁴) of its responsibility to provide funding for capital investment (which averaged £1.1bn per annum in 1999/00 prices during the five years prior to privatisation). Whilst the social cost benefit analysis in this paper focuses on operating costs (and ignores capital costs), it is necessary to reflect the saved capital costs in the calculation of the government's welfare position. The average of £1.1bn per annum is used in the counterfactual to reflect this, and the same figure is used (with a negative sign) to reflect the capital costs which the private sector would need to cover out of operating profits²⁵.

²³ In the analysis in Section IV, subsidies are taken to include both Central Government subsidies (paid through OPRAF), and PTE grants.

²⁴ Note that the Periodic Review (2000) allowed for significant grant payments direct to Railtrack (from 2001/02), to cover the exceptional level of renewal expenditure required over the next control period. However, grants to Railtrack in the years since privatisation (1996/97 to 1999/00) have been relatively small, and are not reflected in the allocation of efficiency gains between government and producers (however, grant income is taken account of in arriving at operating costs – see Appendix A).

²⁵ Thus implicitly assuming that privatisation has no impact on the efficiency or level of capital investment. The evidence on capital is addressed separately in Section IV.4 below.

ΔGov is therefore calculated as follows:

$$\Delta\text{Gov} = \text{Privatisation Scenario (Taxes - Subsidy + Sales Proceeds)}$$

– Counterfactual Scenario (Operating profits/losses + Capital Subsidies)

For producers, there is no counterfactual (since the counterfactual assumes public ownership). ΔProd is simply calculated as the post-tax profits under the privatisation scenario, less the amount paid to purchase the business (the corollary of government sales proceeds), less an amount to reflect capital expenditure (the corollary of the £1.1bn saved capital cost used to calculate ΔGov).

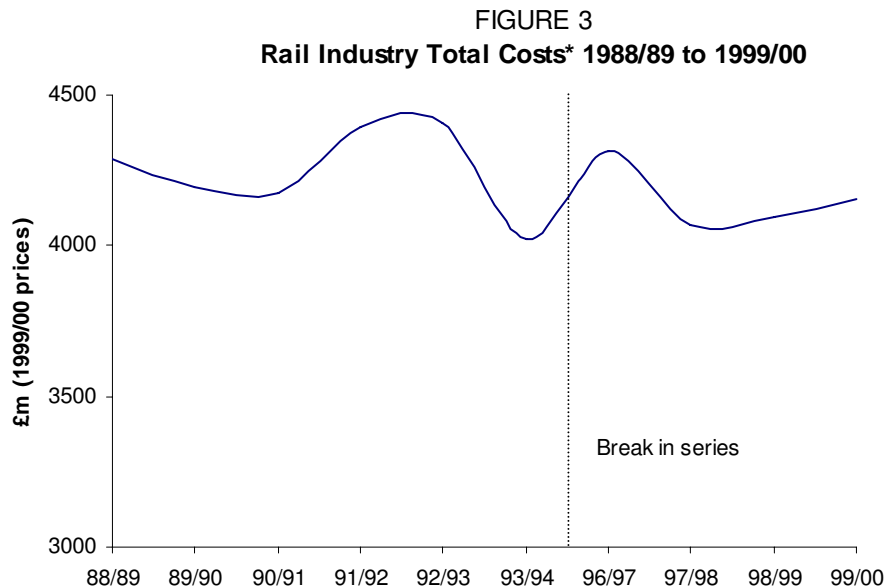
With regard to future projections – that is, beyond 1999/00 - it is assumed that the privatisation scenario variables remain at their 1999/00 levels²⁶, whilst the counterfactual cost and fares gradually fall until they are in line with the privatisation scenario. To complete the above calculations, restructuring costs are subtracted from ΔGov and ΔProd , depending on when the costs were incurred (ie before or after privatisation).

²⁶ This means that the actual government subsidy and the saved capital cost is assumed to remain at its 1999/00 level. Of course, existing franchise agreements build in further subsidy reductions, though it is not clear that these are sustainable. In addition, the debate over the levels of capital expenditure required, and particularly who will fund it, is ongoing.

IV. Results

1. Cost changes

Figure 3 shows the profile of total rail industry costs (actual) over the period 1988/89 to 1999/00. The data show that total costs were rising in the period up until 1992/93, fell sharply in 1993/94, as the restructuring of the industry began, and then remained broadly static in real terms between 1993/94 and 1999/00, whilst industry outputs grew strongly.



* After privatisation, costs are calculated as total revenue less profits, as shown in Table 2.

In order to understand what has been happening to unit costs over the period, we first need to decide on an appropriate measure of output. The next step is to separate out the impact of scale/density effects from underlying efficiency improvements. This second

step requires an assumption about the proportions of fixed and variable costs in the rail industry.

Our measure of output (see Table 2 above), is a composite index based on passenger train miles and freight tonne-miles, weighted according to the split between passenger and freight revenues. With respect to fixed and variable costs we make the following assumptions:

1. based on work carried out during the 2000 Periodic Review of Railtrack's access charges, we assume that 17%²⁷ of infrastructure costs are variable with respect to volume (or 83% of costs are fixed). In our analysis, infrastructure costs make up 36% of the total cost base;
2. for the remainder of the cost base we assume that costs exhibit broadly constant returns to scale (we assume that 10% of these remaining costs are fixed).

Overall, our assumptions on scale mean that around 37% of the cost base is fixed with respect to volume²⁸. Of course there will be other fixed costs, including infrastructure renewal and rolling stock depreciation costs, but these are excluded, as our analysis focuses on operating expenditure, and excludes capital (or depreciation) costs. The variable cost element is assumed to vary in line with our volume index, which is based on passenger train miles and freight tonne-miles.

It is important to note that passenger miles are not included in our measure of volume. This is a conservative assumption which reduces the level of efficiency gains attributed to

²⁷ The Periodic Review analysis found that 17% of maintenance and renewal cost was usage-driven. Since our analysis includes only maintenance costs, we have assumed that 17% of maintenance costs are variable. In addition, traction costs are also assumed to be variable, which (coincidentally) produces a figure of 17% variable costs overall.

²⁸ This assumption is in line with other studies of the rail industry. See, for example, Estache and de Rus (2000), page 208.

privatisation in our calculations. Passenger miles have grown much faster than passenger train miles in recent years (21%, compared to only 13% since 1992/93). We note, however, that whilst train miles are likely to be the main driver of costs, some costs will increase in line with passenger miles (for example, an increased number of coaches have been employed since privatisation to accommodate higher passenger numbers; station and revenue-protection costs are also likely to vary with passenger miles).

Now that we have made our choice of volume measure and assumption about returns to scale, we are in a position to analyse the trends in unit costs (before and after privatisation), and to separate out the scale effects from underlying efficiency gains. Table 3 presents total and unit costs for the pre and post privatisation periods, splitting out the impact of scale effects from efficiency improvements.

The first section of Table 3 shows that scale effects would have caused unit costs to rise by 0.2% per annum over the five years 1988/89 to 1992/93 (falling volumes, with 37% of cost base fixed). Actual unit costs rose by 1.2% per annum, implying negative efficiencies, or an efficiency loss of 1% per annum over the period²⁹. However, we are reluctant to assume a 1% efficiency deterioration as our counterfactual. In our central counterfactual scenario we therefore assume that BR would have delivered efficiency gains of 1% per annum over the period 1992/93 to 1999/00. This assumption weighs heavily in favour of public ownership. However, it gains some empirical support

²⁹ We note that BR made a significant change to its accounting policy in 1991/92, which meant that infrastructure costs were capitalised for the first time. Since BR produced data for 1991/92 on both accounting bases, we have been able to construct a consistent time series for the period 1988/89 to 1992/93. However, the lumpy nature of infrastructure spending may cause problems of comparability of individual years during the period before 1991/92 (though note that major upgrade expenditure was capitalised across the whole period).

from a study by Bishop and Thompson (1992), which found that British Rail delivered labour productivity growth of 0.6% per annum over the period 1970-1990³⁰.

TABLE 3
Unit Cost Analysis

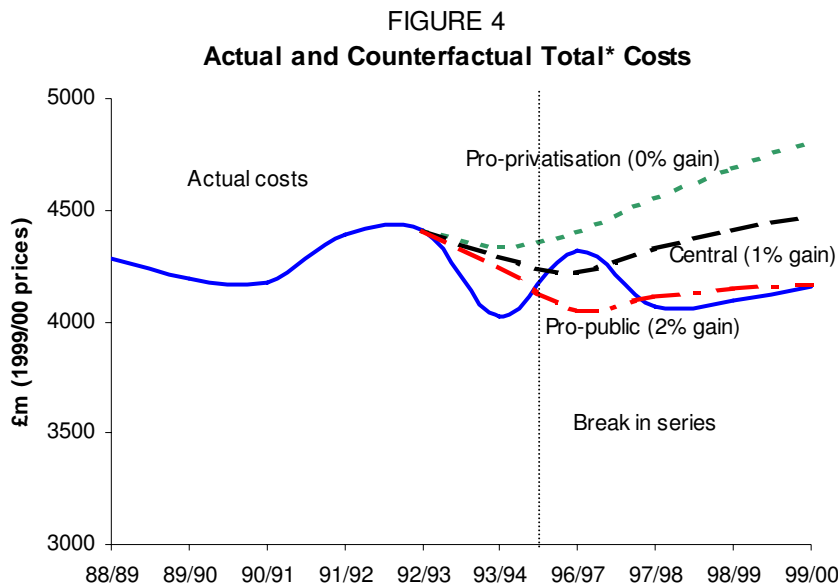
Pre-privatisation period	88/89	89/90	90/91	91/92	92/93	Annual Change
Scale effects – no efficiencies						
Unit costs ^a – after scale effects	42.9	43.0	42.9	43.0	43.2	0.2%
Unit costs						
Actual	42.9	42.4	41.8	44.4	44.9	1.2%
Underlying efficiency gain/(loss)						
Actual						(1.0%)
Post-privatisation period	92/93	96/97	97/98	98/99	99/00	Annual Change
Scale effects – no efficiencies						
Unit costs ^a – after scale effects	44.9	44.9	44.1	43.4	42.9	(0.7%)
Unit costs						
Actual	44.9	44.1	39.4	37.9	37.1	(2.7%)
Counterfactual	44.9	43.2	41.9	40.9	39.9	(1.7%)
Underlying efficiency gain						
Actual						2.0%
Counterfactual						1.0%

(a) Unit costs calculated by dividing total costs by our volume index.

³⁰ This study shows two distinct periods. In the 1970s, labour productivity declined by 2% per year, and then grew by 3.2% per annum in the 1980s. However, the 1980s data is heavily distorted by the partial privatisation process which took place during that period, referred to above. Furthermore, the study uses a volume index which includes passenger miles, rather than train miles.

The second section of Table 3 shows actual and counterfactual unit costs (central scenario) for the post-privatisation period. This shows that actual unit costs fell by 2.7% per annum over the period, of which 0.7% is due to scale effects, and 2.0% to underlying efficiency improvements. Under the counterfactual scenario, unit costs fall by 1.7% per annum, of which 1% per annum results from the assumed underlying efficiency savings, and the balance from scale effects (0.7%).

Figure 4 below shows actual costs, and the profile of counterfactual costs under three scenarios: pro-privatisation scenario (underlying efficiency gain of 0% per annum); central scenario (underlying efficiency gain of 1% p.a., described above); and pro-public scenario (underlying efficiency gain of 2% p.a.). As noted in Section III.2, it is assumed that the efficiency gap opened up by the private sector is gradually closed over the next 15 years (post 1999/00) – that is, the public sector is assumed to catch up. This assumption therefore weighs in support of continued public ownership, and against privatisation.



* After privatisation, actual costs are calculated as total revenue less profits, as shown in Table 2.

2. Calculation of efficiency gains

Table 4 provides estimates of the discounted efficiency gains (pre-restructuring) resulting from rail privatisation in the UK. Estimates are shown for the three alternative assumptions about underlying efficiency improvements under the counterfactual scenario (0%, 1% and 2%). In addition, the results are also shown for two different discount rates, 6% (used by government) and 10% (private sector discount rate).

With a 6% discount rate, the central scenario shows the total discounted efficiency gains to be £2.5bn. This efficiency gain is partly offset by restructuring costs of £1.4bn (see Table 5), yielding efficiency gains net of restructuring costs of £1.1bn.

TABLE 4
Gross Efficiency Savings (Pre-Restructuring)

Counterfactual unit cost reduction	Discount rate	
	6%	10%
0%	£5,200m	£4,800m
1%	£2,500m	£2,200m
2%	(£100m)	(£200m)

TABLE 5
Restructuring Costs

Restructuring costs (present value)	93/94	94/95	95/96	96/97	97/98	98/99	99/00
Government	427	415	239				
Private sector				176	63	33	98
Total	427	415	239	176	63	33	98

Sources: British Rail Annual Reports; Annual Reports for privatised companies (Railtrack; 25 TOCs; 3 ROSCOs; EWS).

Table 6 (below) shows the profiling of the discounted savings between the period to date (1996/97 to 1999/00) and the future (the savings gap achieved to date is assumed to be closed over the next 15 years). The units of the data in Table 6 are £million (discounted).

Under the Central Scenario (6% discount rate), the data show that privatisation has already yielded £800m in efficiency savings, although these savings have been more than offset by restructuring costs (£1,400m). This position is unsurprising, as the industry has only been in private hands for four years, and we would expect the cost of restructuring to be recovered over a longer period. Total savings (including future savings³¹) under the Central Scenario amount to £1,100m (£500m at a 10% discount rate) after restructuring costs.

TABLE 6
Profiling of Efficiency Savings

	Discount rate					
	6%			10%		
	To date	Fut.	Total	To date	Fut.	Total
Pro-privatisation scenario						
Efficiency gains	1,900	3,300	5,200	2,000	2,800	4,800
Restructuring costs	(1,400)	-	(1,400)	(1,700)	-	(1,700)
Net efficiency gain/(loss)	500	-	3,800	300	-	3,100
Central scenario						
Efficiency gains	800	1,700	2,500	800	1,400	2,200
Restructuring costs	(1,400)	-	(1,400)	(1,700)	-	(1,700)
Net efficiency gain/(loss)	(600)	-	1,100	(900)	-	500
Pro-public scenario						
Efficiency gains	(200)	100	(100)	(200)	0	(200)
Restructuring costs	(1,400)	-	(1,400)	(1,700)	-	(1,700)
Net efficiency gain/(loss)	(1,600)	-	(1,500)	(1,900)	-	(1,900)

The data in Table 6 are sensitive to the cost assumption under the counterfactual scenario. The savings estimates are much higher if we assume that underlying unit costs would have remained flat under public ownership (pro-privatisation scenario); on the other hand, under a counterfactual cost assumption of 2% (pro-public scenario), the savings become approximately zero (before restructuring costs)³². However, given the fact that unit costs increased during the pre-privatisation period (by more than would have been expected due to scale effects alone – see Table 3), it is difficult to argue for a counterfactual cost reduction that is more aggressive than assumed in the central scenario.

It is important to note that this paper does not seek to explain the improvements in efficiency. Freeman & Shaw (2000)³³ provide some anecdotal evidence on efficiency improvements achieved by the TOCs (through staff reductions). In addition, during the 2000 Periodic Review Railtrack reported significant efficiency savings since privatisation (2.2% per annum between 1994/95 and 1999/00)³⁴. Over the period since 1995/96, we note that total TOC and Railtrack staff numbers declined from 58,400 to 50,300³⁵, a reduction of 14% (though it has been argued that TOCs reduced staff too quickly in the early years after privatisation, resulting in driver shortages)³⁶. The reduction in TOC/Railtrack headcount provides some support for the efficiency improvements reported in this paper.

³¹ Note that, as described earlier, the future savings do not reflect additional savings – rather they are based on the continuation of the savings gap in 1999/00 into future years (though declining each year as the public sector is assumed to catch up).

³² Note that it is assumed that the public sector (counterfactual) cost profile catches up with the privatisation scenario over time, but that no restructuring costs are required to achieve this catch up. In practice, restructuring costs would also be required under public ownership.

³³ Freeman and Shaw (2000), Chapter 7.

³⁴ See Office of the Rail Regulator (December 1999).

³⁵ TOC staff numbers taken from Affuso, Angeriz and Pollitt (2002); Railtrack data from Railtrack Annual Reports.

³⁶ See Freeman and Shaw (2000), Chapter 7.

Furthermore, a recent survey of rail transport efficiency carried out by Oum, Waters II and Yu (1999) found that increased competition (driven by liberalisation and deregulation) led to improved efficiency in almost all of the papers reviewed³⁷. This finding was confirmed during the 2000 Periodic Review of Railtrack's access charges, where international and UK evidence all pointed to the strong efficiency savings expected from change of ownership (and deregulation). These arguments were used to inform the Regulator's decision on future efficiency targets for Railtrack over the second control period (2001 to 2006).

3. Allocation of efficiency savings

Table 7 shows the allocation of the efficiency gains/(losses) between producers, government and consumers. $\Delta\text{Gov}/(\Delta\text{Prod})$ include the privatisation proceeds /(payments). The subsidy data used in the analysis include both OPRAF subsidies and PTE grants. The units of the data in Table 7 are £million (discounted).

The key result from the above table is that the consumer benefits from privatisation to the tune of £1.2bn. Average revenue (passenger and freight revenue divided by a composite volume index based on passenger miles and freight tonne-miles) was lower in real terms in every year since privatisation than before the sell-off (see Figure 5 below). This gain has been secured, in part, by the arrangements put in place to constrain price increases on regulated fares below the rate of inflation. Before privatisation, prices were

³⁷ We note that in the case of Britain's railways, competition between passenger train operators has been limited mainly to overlapping franchises and duplicate routes. However, the franchise process resulted in significant competition for franchises (competition for the market). In addition, some competition has developed in the freight business. Other elements of the value chain have also been subject to competition (at least in theory), for example, infrastructure maintenance companies, and ROSCOs.

often increased in real terms to choke off demand (the counterfactual assumes that this policy would have been continued).

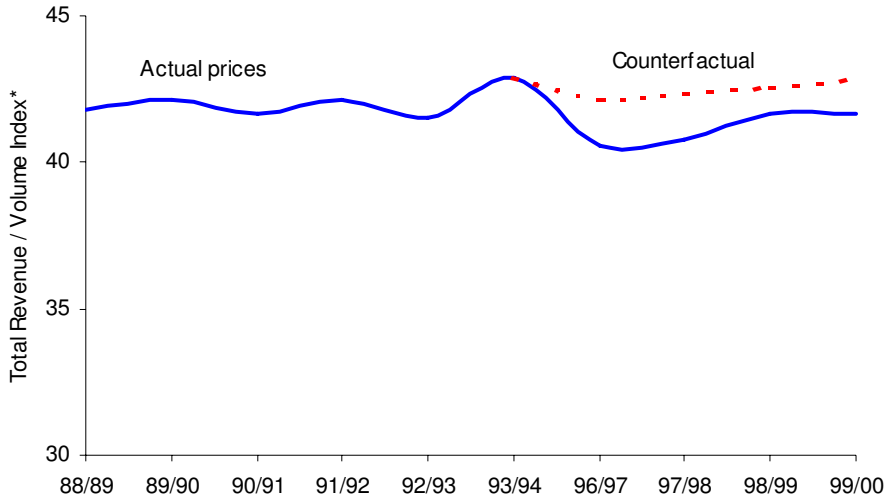
TABLE 7
Allocation of Efficiency Savings

	Discount rate	
	6%	10%
	Pro-privatisation scenario (cost fall of 0% pa)	
ΔGov	2,400	3,900
ΔProd ³⁸	200	(2,000)
ΔCust	1,200	1,200
ΔW	3,800	3,100
	Central scenario (cost fall of 1% pa)	
ΔGov	(300)	1,300
ΔProd	200	(2,000)
ΔCust	1,200	1,200
ΔW	1,100	500
	Pro-public scenario (cost fall of 2% pa)	
ΔGov	(2,900)	(1,100)
ΔProd	200	(2,000)
ΔCust	1,200	1,200
ΔW	(1,500)	(1,900)

Overall, under the Central Scenario, consumers gain slightly more than the level of savings, leaving producers and government together with a loss of £100m. The split between government and producers takes accounts of the privatisation sales proceeds (£7bn in present value terms – see Table 8 below). However, the split between the two groups is also highly sensitive to the assumption made about the government’s savings through reduced capital investment (and correspondingly the level of private capital investment), which is not the focus of this paper.

³⁸ Note that changes in the counterfactual cost assumption only affect the payout to government: a better counterfactual cost performance means that the government would have had to provide lower support to the industry under public ownership, which means that its gains are lower the higher the counterfactual cost reduction. Consumer benefits (based on prices) and producer gains (based on actual, not counterfactual performance) are unaffected by changes in the counterfactual cost assumption

FIGURE 5
Actual and Counterfactual Average Revenue



* Weighted index based on passenger miles and freight tonne-miles.

TABLE 8
Rail Privatisation Proceeds

Rail Privatisation proceeds	£bn (current prices)	£bn (present value)
Railtrack *	2.5	3.5
ROSCOs	1.7	2.4
Freight	0.3	0.4
Infrastructure & Maintenance cos.	0.3	0.4
BR Central Services	0.2	0.3
Total	5.0	7.0

* Includes £596m of debt.

Sources: NAO Reports (HC 576, Session 1997/98; HC 25 Session 1998/99); Public Enterprise Partnerships Team, HM Treasury.

4. Capital costs

We have already noted that capital costs have been excluded from the social cost benefit analysis presented in this paper. Constructing a counterfactual scenario for capital

investment is especially difficult, since it is affected by so many different factors (for example, the timing of large enhancement projects; traffic levels; the lumpy nature of renewal programmes; cash constraints imposed by Treasury before privatisation; and investment delays resulting from the privatisation process itself). Problems with capital measurement and comparability mean that railway efficiency studies often focus solely on operating costs.

However, railway investment is important in the present context for three reasons. First of all, the overall level of capital investment will impact on output quality (safety, asset condition and performance). Secondly, the obvious question arises concerning the relative efficiency of capital investment under public and private ownership. Finally, it is possible that capital substitution effects may have contributed to the operating efficiency savings reported in the previous sub-section. Whilst there is insufficient information to consider these effects within the formal SCBA methodology, in the discussion below we seek to draw some indicative conclusions from the available data.

(a) Capital investment levels before and after privatisation

The privatised rail industry has been heavily criticised for its record on safety and performance. Much of this criticism has been directed at Railtrack, which, it is argued, has failed to invest sufficiently to maintain the condition of the network. However, the key question for this paper is whether the position would have been better or worse under public ownership. Of course, this assessment is subject to considerable uncertainty, as

already noted. However, the data suggests that it is highly unlikely that investment levels would have been higher under public ownership (see table 9 below).

Table 9 shows the total investment in Britain's rail industry over the period 1988/89 to 1999/00, as well as the breakdown between rolling stock and other (which largely relates to infrastructure renewal and enhancement)³⁹. This data includes investment made by BR in preparation for the running of services through the Channel Tunnel⁴⁰. Table 9 shows that total investment (real terms) has been considerably higher in the post-privatisation period, especially from 1998/99. In 1999/00, total investment was more than double the level of twelve years earlier (1988/89).

TABLE 9
Investment in Britain's Rail Industry

£m (99/00 prices)	Rolling Stock	Other	Total
1988/89	316	739	1055
1989/90	331	927	1258
1990/91	432	910	1342
1991/92	561	1039	1600
1992/93	644	1125	1769
1993/94	493	890	1383
1994/95	414	1025	1439
1995/96	224	1007	1231
1996/97	51	1277	1328
1997/98	120	1508	1628
1998/99	180	1867	2047
1999/00	236	2012	2248

Source: SRA

³⁹ Although there are some definitional changes (from 1994/95 and post 1995/96), these do not appear to have a significant impact on the data.

⁴⁰ Services through the tunnel started in 1994/95.

However, it is clear that there are two stories here. Rolling stock investment has been much lower in the post-privatisation environment (though the pre-privatisation data includes rolling stock for the Channel Tunnel). The privatisation process itself created considerable uncertainty which impacted on investment in the transition period (93/94 to 95/96); and the newly privatised industry was slow to invest during the early years (from 96/97), although investment doubled in 2000/01 compared to 1999/00. However, we note that the number of rolling stock units increased over the period (between 1995 and 2000)⁴¹, and the number of train miles also increased sharply as described earlier in the paper. We therefore consider that the delay in rolling stock orders did not adversely affect the availability of services.

On the other hand, infrastructure investment has been considerably higher after privatisation. Table 9 shows that, in 1999/00, infrastructure investment was almost three times the level of 1988/89. Furthermore, between 1995/96 and 2000/01, Railtrack was projected to spend around £1 billion more on renewals than was anticipated at the time of the Regulator's review of access charges in 1995 (this projection was made before the Hatfield accident)⁴². Whilst the Regulator has argued that Railtrack's investment was still too low, given the sharp rise in traffic growth on the network, it is far from clear that more investment would have been forthcoming under public ownership. It is well recognised that public sector cash limits led to persistent underinvestment in the rail network during BR's stewardship, as table 9 shows.

In conclusion, the evidence shows that investment has been much higher after privatisation than under the former BR period – especially in the key area of

⁴¹ See Affuso, Angeriz and Pollitt (2002).

⁴² See Freeman and Shaw (2000), page 78.

infrastructure investment. Given this data, we conclude that it is very unlikely that investment levels would have been higher under the counterfactual scenario; and indeed, may have been considerably lower. We therefore expect that many of the output quality issues, which have arisen since privatisation, would also have occurred under continued public ownership (assuming the same level of traffic growth). Output quality trends are discussed further in Section IV.5 below.

(b) Efficiency of capital investment

Data on total capital expenditure is of little help in comparing the efficiency with which rail projects have been planned and delivered under public and private ownership. Furthermore, we are not aware of any academic studies which have attempted such an analysis. This is unsurprising, given the difficulty of making like-for-like comparisons, especially between large, complex projects, which make up the bulk of Railtrack's capital programme. An alternative way of assessing the efficiency of capital investment (or project management), is to compare initial forecasts of project costs with the final outturn. However, this approach suffers from the problem that the final cost of a project may change due to many factors which are not related to efficiency (for example scope changes).

A case in point, is the ongoing West Coast Main Line (WCML) upgrade project. This project was originally budgeted (1996) to cost £2.3bn. By the Periodic Review (October 2000), the estimates had increased to £5.8bn (an overrun of 150%; see table

10)⁴³. This project is often quoted in the media as an example of the inefficiency of the privatised rail industry in delivering large capital projects.

However, the majority of the cost overrun can be explained by two factors. First, the decision to adopt a conventional signalling strategy (after the original, more advanced technology had proved unworkable). Second, the re-evaluation of the renewals element of the programme, as Railtrack developed a better knowledge of the poor state of the track inherited from BR, as well as the impact of traffic growth on the network since privatisation. Note that the bulk of the cost increase in table 10 relates to the core, renewal element of the programme. It should also be noted that the original cost estimates for the core investment programme were prepared - and contracts signed - whilst Railtrack was still under public ownership (March 1996).

TABLE 10
The Estimated Cost of the
West Coast Main Line Project

Categories of expenditure £m 1998/99 prices	1996	2000
Core investment programme (renewal)	£ 1.5bn*	£3.9bn
Upgrade	£0.8bn**	£1.9bn
Total cost	£2.3bn	£5.8bn

* Contracts signed in March 1996 (before the privatisation of Railtrack).

** Contracts signed in two stages (October 1996 and June 1998).

Source: ORR.

⁴³ Various, higher estimates have been made since then.

To put the WCML project into perspective, it is worth considering some other examples. Skamris and Flyvbjerg (1997) provide evidence on cost overruns for large rail and road projects in the UK, US and Sweden (during the last 15 years). Their study found that cost overruns of 50% to 100% are common; and also reported overruns on some projects in the range 100% to 500% (though they note that this analysis is problematic, since part of the overspends may be due to project rescoping).

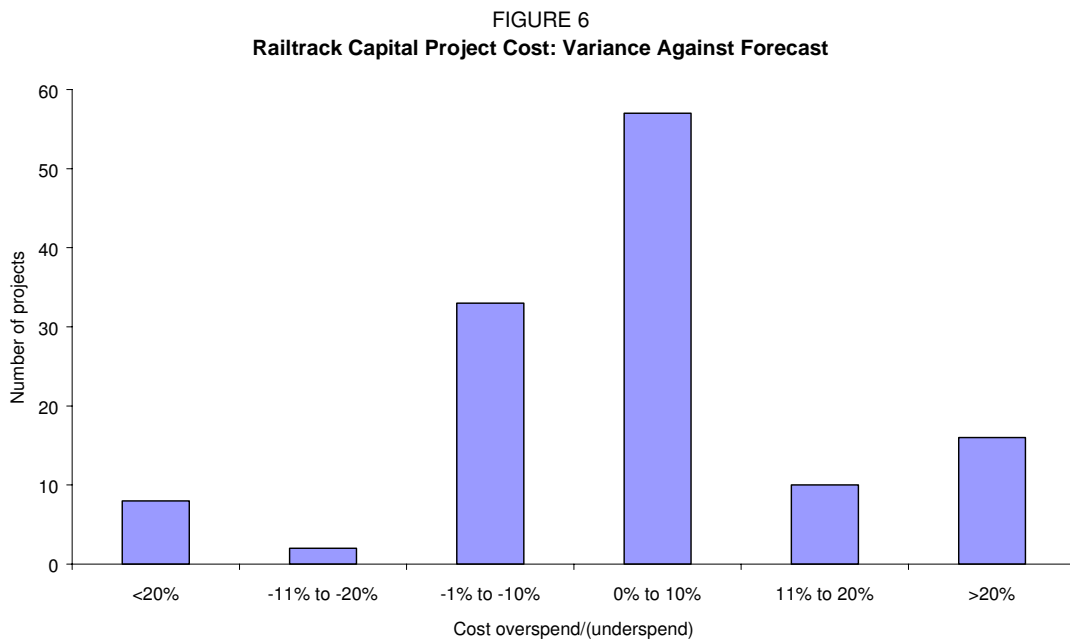
In respect of the former BR period, we have found little available evidence on forecast and final outturn costs for major projects⁴⁴. The one project which we have been able to identify is British Rail's investment programme in preparation for Channel Tunnel services (covering the period 1985/86 to 1993/94). The original estimate for the project was £700m (1999/00 prices), compared with the final outturn of £1.8 billion (an apparent overrun of around 150%)⁴⁵. As with the other analyses, it is difficult to identify the reasons for this increase (for example, to separately identify changes in scope).

However, we also note that four separate reports (Monopolies and Mergers Commission, 1980, 1989, and 1991 and National Audit Office, 1985) highlighted concerns over the investment policies of British Rail and other nationalised industries during the 1980s and early 1990s. In particular, questions were raised over the impact of (Treasury-imposed) financial constraints, both on the level of funding (with consequent implications for asset condition and safety), as well as their impact on the ability of British Rail, and others, to develop sensible long-term plans. The reports also noted the failure of public sector organisations to compare project outcomes with the original plans.

⁴⁴ We have examined a number of sources: BR Annual Reports (1970-1974), National Audit Office, Public Account Committee, Select Committees (1960s onwards).

⁴⁵ £400m and £1.56bn respectively in current prices.

Finally, Figure 6 shows the range of over and under-spends on a sample of all Railtrack projects (>£10m) completed during 2000/01 and 2001/02. These figures compare project outturn cost with revised budget. The revised budget takes some account of project scope changes, as well as the realisation of risks which were identified at the time that the original budgets were set. On average, these data show cost overruns of 6% (compared to the revised budget), though many projects came in under budget. When compared against the original budget or authorisation value, the average cost overrun is 29% (though this average includes projects with overruns in excess of 1000%, which clearly indicate significant changes in project scope).



Source: Railtrack

In conclusion, we do not believe that there is sufficient evidence to determine whether (rail) capital investment is more or less efficient under public or private

ownership. Whilst the privatised rail industry has been criticised in this regard, it is clear that major problems existed under the old BR system. Evidence from other sources suggests that significant cost overruns, such as those observed on the Channel Tunnel and WCML rail projects, are common for large, complex infrastructure projects.

(c) Capital substitution effects

As noted above, it is possible that the operating cost savings reported in Section IV.2 are in part explained by capital substitution effects. However, we argue that such effects do not have a significant impact on our analysis. First of all, the counterfactual operating cost assumption is based on labour productivity and operating cost data, which itself would be impacted by capital substitution during the pre-privatisation period. Secondly, TOC initiatives have been a major driver of cost savings since privatisation (see above); however TOC capital investment is not significant relative to overall industry investment levels. Finally we note that Railtrack's total costs (including depreciation) have fallen by almost the same percentage as operating costs since privatisation (6.5% compared with 6.9% for operating costs)⁴⁶.

5. Output quality

The previous analyses have demonstrated that privatisation has resulted in significant improvements in operating efficiency. Evidence has also been presented which suggests that the privatised rail industry has performed at least as well as BR in terms of capital

costs (overall investment levels and capital efficiency). However, a key question is what has happened to output quality. There are four quality measures which should be considered: train performance (delays); train crowding; asset condition (broken rails; track quality) and safety (accidents and signals passed at danger (SPADS)).

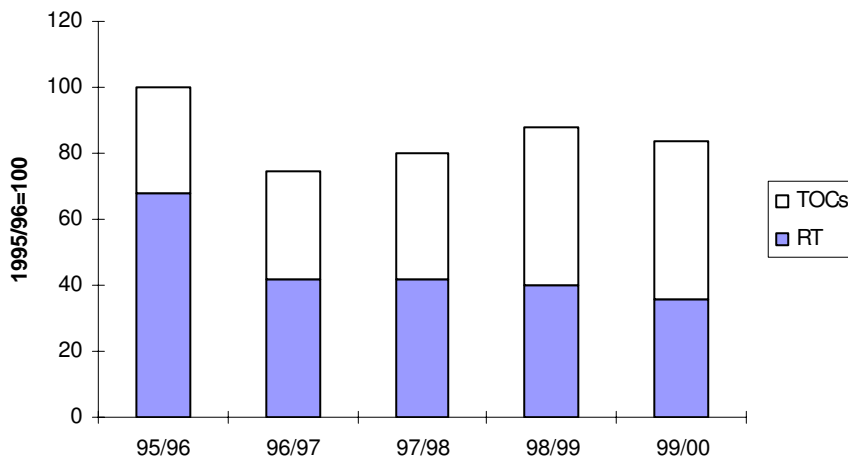
To date the industry's performance in these areas has been strongly criticised from many directions, particularly in the aftermath of Hatfield – and privatisation, with its focus on contractual regimes between disparate industry players, and the need to provide a return for shareholders, has often been blamed. However, looking at the pre-Hatfield data, it is far from clear that continued government ownership (the counterfactual) would have produced better results. Below we look at the four measures in turn.

(a) Train performance

Train performance (delay per passenger train) has improved significantly since privatisation (pre-Hatfield – see Figure 7 below)⁴⁷. Performance improved sharply in the first year after privatisation (due to improvements by Railtrack), but then deteriorated steadily over the next three years (due to worsening train operator performance), before improving again in 1999/00. Overall, delays per passenger train in 1999/00 were down 16% compared to 1995/96. The performance regimes which exist between Railtrack and the TOCs, and between the TOCs and OPRAF/SRA, provide rewards/penalties for performance above/below target. These regimes have focused management attention on the issue of performance.

⁴⁶ 1995/96 to 1999/00.

FIGURE 7
Delay per passenger train



Source: Railtrack.

The key question is what would have happened to performance under public ownership, given the sharp volume growth we have seen in recent years. Of course, it is impossible to know for sure, though we note the absence of performance regimes under the old structure. However, we can gain some insight by comparing the changes in train performance and volume growth between 1995/96 and 1999/00 (under a privatised structure), with a comparable five-year period of volume growth during the boom of the mid-to-late 1980s (under the old BR structure).

Table 11 shows that, since privatisation, train performance (measured by punctuality) has improved by 2.7%. This improvement was achieved against a background of growth in passenger miles and passenger train miles of 28% and 11% respectively over the

⁴⁷ We recognise that this conclusion is based on a single years' data from 1995/96 (before Railtrack or the TOCs had been fully privatised). Data from earlier years is not comparable with later periods.

period. During a comparable period in the 1980s (1984/85 to 1988/89)⁴⁸, which saw lower volume growth, performance actually deteriorated (see Table 12). Even if we strip out the sharp improvement in performance achieved in the first year of the newly privatised structure (1996/97), the deterioration since then only amounts to 0.6%, compared to 1%⁴⁹ during the period of BR control in the mid 1980s – whilst volume growth has been much greater.

It therefore seems unlikely that train performance would have been better under public ownership; indeed, the evidence suggests that it may have been considerably worse.

TABLE 11
Train Performance and Volume: Post-Privatisation

Performance	95/96	96/97	97/98	98/99	99/00	Change
Punctuality ^a	89.5%	92.5%	92.5%	91.5%	91.9%	+ 2.7%
Pass. Train miles (m)	231	229	237	249	257	+ 11%
Pass. Miles (bn)	18.6	19.9	21.6	22.6	23.8	+ 28%

(a) Percentage of trains on time.

Sources: National Rail Trends 2000/01, Q2; Transport Trends, 2001 Edition (DTLR). OPRAF Annual Reports (1996/97 to 1999/00).

TABLE 12
Train Performance and Volume: BR Regime

Performance	84/85	85/86	86/87	87/88	88/89	Change
Punctuality ^a	90%	89%	90%	90%	89%	(1%)
Pass. Train miles (m)	202	201	203	213	222	+ 10%
Pass. Miles (bn)	18.5	18.9	19.2	20.1	21.3	+ 15%

(a) Percentage of trains on time.

Sources: BR Annual Reports 1985/86 to 1989/90. Transport Trends, 2001 Edition (DTLR).

⁴⁸ This period saw sharp growth passenger miles, train miles and freight tonne-miles. 1988/89 is taken as the cut-off point, as passenger miles started to deteriorate after that date.

⁴⁹ Though note that the BR data is not quoted to 1 decimal place.

(b) Train overcrowding

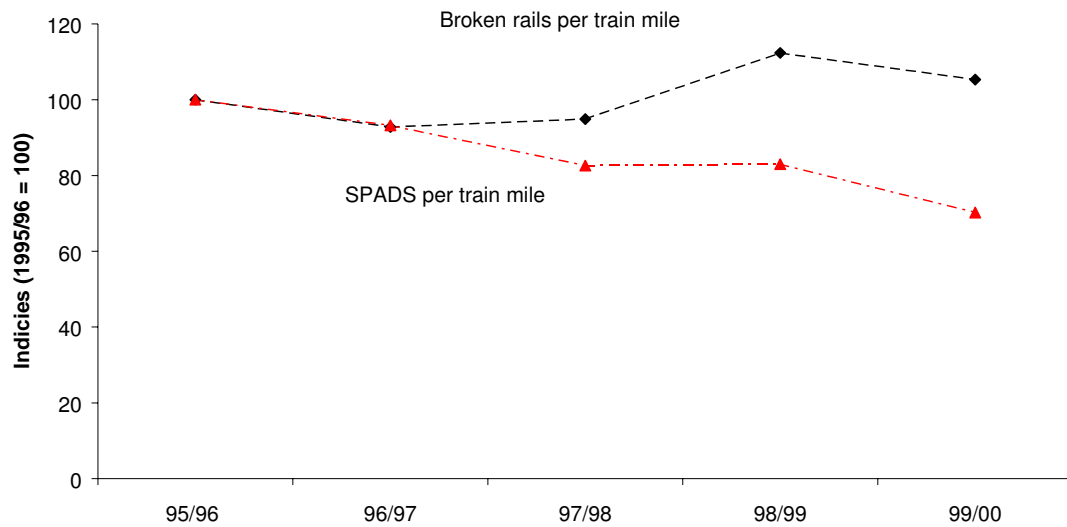
Meanwhile, train overcrowding (commuter services) has got worse, with four of the ten train operators serving the London market experiencing excessive overcrowding in 1999/00⁵⁰. It is clear that overcrowding would also have worsened considerably under continued government ownership, given the unprecedented passenger growth we have seen (which is assumed to be exogenous in this paper).

(c) Asset condition

The data show that asset condition on the network has deteriorated since privatisation. The number of broken rails (per train mile) started to increase in the mid-1990s (see Figure 8 below), though fell back again by 1999/00. The Regulator has argued that Railtrack's investment in track maintenance and renewal – though greater than envisaged when the company's charges were set at privatisation – was insufficient, given the level of traffic growth. Railtrack inherited a network which had suffered from underinvestment for many years. As noted above, it is therefore unclear whether extra money for investment would have been forthcoming under government ownership. The arguments on asset condition are largely concerned with capital investment levels, and do not affect our analysis of operating costs.

⁵⁰ SRA Annual Report, 1999/00.

FIGURE 8
Broken Rails and SPADS



(d) Safety

Finally, concerns over safety have increased since privatisation. However, the data on accidents do not show any statistically significant change since privatisation, as noted in the Health & Safety Commission “Cullen” report (2001) – written post-Hatfield:

*“The statistics do **not** bear out a picture of a declining safety trend. Professor A W Evans, Professor of Transport Safety at the Centre for Transport Studies at University College London, had made an extensive statistical analysis of the safety performance of the railways before and after privatisation. **He concluded that safety performance was the same before and after privatisation**”.*

Furthermore, Figure 8 shows that signals passed at danger (SPADs)⁵¹, which are effectively a measure of accident risk, have fallen consistently since privatisation. Of course, safety statistics do not necessarily alleviate passenger concerns; nevertheless, there is, at present, no evidence to suggest that Britain's railways are less safe than they would have been under continued public ownership.

(e) Overall output quality

To sum up, the pre-Hatfield data presents a mixed view on output quality since privatisation. Broken rails have increased, and train overcrowding has undoubtedly got worse. On the other hand, train performance has improved, SPADS are down, and there is no evidence to suggest that safety has deteriorated. However, the analysis in this paper is not primarily concerned with the quality position before and after privatisation, but rather with comparing the privatisation scenario with what would have occurred under continued public ownership. In this regard, we note the experience of underinvestment which persisted in the old BR days, and the evidence presented on train performance during a period of rising traffic growth in the 1980s. On this basis we argue that it is unlikely that output quality would have been better under the counterfactual; and may have been considerably worse.

Of course train performance has deteriorated sharply since the Hatfield accident, as Railtrack responded by closing large parts of the network. The industry has taken a

⁵¹ Measured per train mile.

significant financial hit as a result (a £644m provision in Railtrack's 2000/01 results⁵²), and it could be argued that these costs should be set against the savings reported earlier. It remains to be seen how the cost and quality measures will emerge in the coming years.

The Regulator has argued that the large-scale closure programme, in the aftermath of Hatfield, was caused by the lack of an adequate asset register (and therefore knowledge of the condition of the company's assets)⁵³. However, the closure programme also reflects a lower risk tolerance since privatisation. This reduction has a value, though is difficult to quantify. Perhaps BR would not have taken the course adopted by Railtrack, but passengers may have faced a higher risk as a result.

V. Conclusions

In the aftermath of the government's announcement (October 2001) – to place Railtrack into administration - attention has focused on what went wrong with privatisation, and how crucial network investment will be financed in future. Against this background, our aim has been to evaluate the operating cost efficiency gains (or losses) resulting from privatisation and restructuring, using a social cost-benefit analysis framework. The actual data used in our analysis cover the period to (financial year) 1999/00, and therefore stops short of the Hatfield accident. The next financial year (2000/01), which includes Hatfield, is not representative of the period since privatisation as a whole (and not all of the financial data are available in any case). We conclude that:

⁵² This includes performance payments to train operating costs and increased depreciation costs resulting from Hatfield.

⁵³ Much of the data on asset condition was transferred from Railtrack to the infrastructure maintenance and renewal companies on privatization.

1. Industry outputs have risen sharply since privatisation (1992/93 to 1999/00). Passenger train miles, passenger miles and freight tonne miles have grown by 13%, 21% and 19% respectively. At the same time, the operating cost base has been reduced by 6% in real terms. As a result, unit costs have fallen sharply over the period, by 17% (or 2.7% per annum). After taking account of scale effects, the rail industry has achieved efficiency savings of 13% (or 2% per annum) since privatisation.
2. The post-privatisation performance on efficiency has been significantly better than that achieved under public ownership. During the five years prior to privatisation, unit costs went up by approximately 1% per annum (after stripping out the impact of scale effects). However, for our central scenario, we have assumed counterfactual efficiency savings of 1% per annum.
3. In the central scenario, privatisation and restructuring has generated efficiency savings to date of about £800m, compared to the counterfactual of continued public ownership. The savings, achieved over only four years, are more than offset by restructuring costs. However, assuming that the savings achieved to date are rolled forward into the future (though declining to zero over 15 years as the public sector catches up), the total savings rise to £2.5bn under the central scenario (pre-restructuring), or £1.1bn after restructuring costs. We note that the savings reported here are sensitive to the counterfactual cost assumption⁵⁴.

⁵⁴ The results are also sensitive to the assumptions concerning the level of fixed costs in the industry, though we consider that we have built in sufficient scale economies into our calculation.

4. Consumers have benefited considerably from privatisation (£1.2bn) – indeed by more than the level of savings. Table 7 shows that, as a result, producers and government together lose £100m, with the government losing £300m, whilst producers gain £200m.
5. We argue that output quality is no lower (and is probably better) than it would have been under continued public ownership (pre-Hatfield). This conclusion is based on the experience of persistent underinvestment under BR’s stewardship of the network, and the deterioration in train performance which occurred following the sharp traffic growth during the 1980s. Despite concerns over safety, the Cullen report – written after the Hatfield accident - found safety performance to be (statistically) the same before and after privatisation. Furthermore, SPAD data show a continued trend of improvement since privatisation, suggesting lower accident risk.

Of course, post-Hatfield, train performance has worsened dramatically, and the industry has taken a significant financial hit as a result (£644m). This position resulted partly from the lack of an adequate asset register, which led Railtrack to close down large parts of the network. However, it also reflects a reduction in risk tolerance since privatisation. Whilst British Rail may not have taken the same action as Railtrack, passengers may have been subjected to higher risk as a result. The value of this reduced risk is often ignored and is difficult to quantify.

Looking forward, the achievement of further efficiencies in the future will be key to delivering the government’s objective to improve rail services. This paper finds that a privatised structure, where shareholders demand a return on their investment, has led to

significant improvements in operating efficiency - it remains to be seen whether the new regime, with a not-for-profit infrastructure owner, will deliver the same efficiency improvements.

APPENDIX A CALCULATION OF INDUSTRY COSTS

<i>Costs before privatisation (up to 1992/93)</i>	<i>Costs after privatisation (1996/97 onwards)</i>
<p>For the period prior to privatisation, industry operating costs are taken direct from the BR accounts:</p> <ul style="list-style-type: none"> • The starting point for determining industry costs is BR's operating costs before exceptional items (the latter includes restructuring and severance costs – these are included separately in our analysis within R&P costs). • Depreciation is subtracted, to obtain operating costs before depreciation; • The amortisation of deferred grant income (ie. the amount of capital grant released to the P&L to cover depreciation costs), which appears as a negative cost, is also taken out (therefore increasing costs to their true level). • EU and level crossing grants are added back (again, these appear as negative costs). • Note that Channel Tunnel costs were capitalised, and therefore had no impact on operating costs. However the pre-privatisation data do contain some costs in respect of Union Railways (planning costs for the high-speed rail link between London and the Channel Tunnel). These costs have not been stripped out since we expect that similar costs are currently being incurred on large projects (for example, WCML) and are being absorbed within operating costs in the post-privatisation data. 	<p>For the period after privatisation, costs are calculated as follows:</p> <ul style="list-style-type: none"> • Total industry operating profits (pre-depreciation) are subtracted from total final revenue from customers/funders. • Total final revenue is derived by adding the revenues (including subsidy) for all 25 TOCs, plus the two largest freight operators, EWS and Freightliner. In addition, other Railtrack revenue is also added (this is property income, which would have previously been received by BR. It also includes a small amount of grant income). Open-access revenue (Channel Tunnel and Heathrow Express) is excluded (did not exist under BR – and is not included in the volume data used to calculate unit costs). • Industry profits are taken as the sum of TOC, freight operator, ROSCO and Railtrack operating profits. The profit data exclude depreciation, exceptional items (restructuring) and profits from any asset sales. As for the BR data, any grants included as negative costs are added back. • As noted in the main report, the profit data do not take account of the profits made by the many supplier companies providing services to the industry (particularly the infrastructure maintenance and renewal companies). To this extent, post-privatisation costs are over-estimated, and therefore savings underestimated. However, the post-privatisation data exclude the costs of minor freight operators. The costs of the Strategic Rail Authority are included. Residual BR costs have not been added to the post-privatisation costs (see section III.2 above). • The Railtrack Asset Maintenance Plan (AMP) charge is treated as depreciation (this treatment was formally adopted by the company in 1997/98).

APPENDIX B

COMPARING PRE- AND POST-PRIVATISATION DATA

The following table compares the cost base in 1993/94 with 1994/95, following the creation of Railtrack. During this year, it is often reported that the revenue subsidy doubled – and this fact is used to discredit the privatisation process. However, the cost (before depreciation) increased by only 1.6% in nominal terms (and actually fell in real terms). The step change in subsidy in 1994/95 can be explained largely by two factors:

1. in preparation for privatisation, the financial flows were restructured to allow each element of the business to earn a commercial return (the government captured these returns through sales proceeds); and
2. on its formation in 1994/95, Railtrack introduced a new method of accounting⁵⁵ for maintenance and renewals expenditure, in line with other regulated industries (e.g.. BAA and Water Companies)⁵⁶.

⁵⁵ Asset Plan Maintenance (AMP). See Railtrack Annual Reports.

⁵⁶ See Bradshaw & Lawton-Smith (2000), page 114-115. Previously, BR had accounted for this cost on a “pay-as-you-go” basis (and the investment in maintenance and renewal had been insufficient to maintain the network in steady-state in the years prior to privatisation).

Industry Costs (£m current prices)	1993/94	1994/95			
		BR	Railtrack	Consol.	Total
Staff costs	2,493	2,149	287	-	2,436
Materials, supplies/services	1,119	1,157	5	-	1,162
Other external charges	-	-	1,215	(1,238)	(23)
Own work capitalised ^a	(253)	(22)	(61)	-	(83)
Access charges	-	2169	-	(2,169)	-
Other ^b	50	19	(46)	-	(27)
Total before depreciation	3,409	5,472	1,400	(3,407)	3,465
Depreciation (inc. AMP)	292	169	576	-	745
Total cost	3,701	5,641	1,976	(3,407)	4,210

(a) Includes other operating income

(b) Includes other adjustments to reflect grants included as negative income, and stripping out of privatisation costs within Railtrack.

Sources: British Rail Annual Reports, 1993/94 and 1994/95; Railtrack Annual Report 1994/95.

The table also shows that the increase in cost (and hence subsidy) was driven by a rise in depreciation resulting from a change in accounting policy as explained above. Since other (non-depreciation) costs remained broadly the same, there is no evidence to suggest that the change in accounting policy led to any transfer of costs between operating and capital expenditure.

APPENDIX C

KEY ASSUMPTIONS OF THE SOCIAL COST BENEFIT ANALYSIS

The key assumptions are summarised in this appendix.

	Period to date (to 1999/00)		Projections (15 years)
	Privatisation (actual)	Public ownership (counterfactual)	
Operating costs	See Appendix A	1992/93 cost base projected forward based on assumptions concerning scale effects, and three different scenarios for underlying efficiency gains.	The efficiency gap opened up by the privatisation scenario is assumed to be closed in a linear fashion over the next 15 years.
Restructuring costs	All restructuring costs included from 1993/94 to 1999/00 (both costs incurred by BR, and privatised companies).	None	No further restructuring costs assumed in the projections.
Prices	Calculated as total TOC and Freight operator revenue divided by a composite volume index, based on passenger miles and freight tonne-miles.	Price trends calculated from BR revenue and volume data are extrapolated forward from the 1993/94 base to 1999/00.	The price advantage (ie lower prices) generated by the privatisation scenario is assumed to be closed in a linear fashion over 15 years.
Subsidies	Actual data taken from National Rail Trends (2000/01, Q2), SRA.	Assumes that the government would pay revenue subsidies equal to operating losses. Also assumes that the government would continue to cover capital costs (see below), at the average level over the 5 years before privatisation (£1.1bn per annum).	Actual scenario continues at the 1999/00 level. The counterfactual level of revenue subsidies gradually changes as cost efficiencies and price reductions feed through over 15 years (see above).
Capital costs	Ignored in the analysis, except in calculating the change in welfare between government and producers. Since the counterfactual assumes that the government would have continued to invest £1.1bn per annum to fund capital costs, we assume that the private sector would also need to provide this same amount of funding under the privatisation scenario (no capital savings assumed).		Continues at 1999/00 levels for fifteen years.
Volumes	Actual data taken from National Rail Trends (2000/01, Q2), SRA.	Volume growth assumed to be same as for the privatisation scenario.	No further volume growth assumed.

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Company Accounts and Reports

Angel Trains	1996/97 to 1999/00
British Railways Board	1985/86 to 1995/96
English, Welsh and Scottish Railways ⁵⁷	1996/97 to 1999/00
Eversholt	1996/97 to 1998/99
Porterbrook	1996/97 to 1999/00
Railtrack	1994/95 to 1999/00
Train Operating Companies ⁵⁸	1996/97 to 1999/00

⁵⁷ Note that data for Freightliner taken from the company's web site (for 1998/99 and 1999/00 only).

⁵⁸ As noted in the notes to Table 2, data for some TOCs is not available for 1999/00.