# UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL & HUMAN SCIENCES
School of Geography


## Evaluating the Long Term Impacts of Transport Policy: The Case of Passenger Rail Privatisation in Great Britain


By

**Dawn Louise Robins**



Thesis for the degree of Doctor of Philosophy

May 2011

Dawn Louise Robins

UNIVERSITY OF SOUTHAMPTON

# Abstract

Faculty of Social and Human Sciences

School of Geography

Doctor of Philosophy

Evaluating the Long Term Impacts of Transport Policy: The Case of Passenger Rail Privatisation in Great Britain

By Dawn Louise Robins

Britain's national rail system was 'privatised' as a result of the 1993 Railways Act, with most of the organisational and ownership changes implemented by 1997. This thesis examines the long term impacts of the privatisation initiative on the passenger rail service. A key issue when examining long term changes is that of the counterfactual – what would have happened if the changes had not occurred? A simple econometric model of the demand for passenger rail services was developed and used in conjunction with extrapolative methods for key variables such as fares, train kms and GDP to determine demand-side counterfactuals. Extrapolative methods were also used to determine counterfactual infrastructure and train operation costs.

Although since privatisation rail demand has grown strongly, the analysis indicates that transitional disruptions suppressed demand by around 4% over a prolonged period (1994/95 to 2005/6), whilst the Hatfield accident reduced demand by about 5%, albeit over a short period (2000/1 to 2005/6). A welfare analysis indicates that although consumers gained as a result of privatisation, for most years this has been offset by increases in costs. An exception is provided by the two years immediately before the Hatfield accident. Overall the loss in welfare since the reforms were introduced far exceeds the net receipts from the sale of rail businesses. It is found that although the reforms have had advantages in terms of lower fares and better service levels than otherwise would have been the case, this has been offset by adverse transitional effects and high costs, which in turn may be linked with higher transaction costs.

Contents

# Figures

# Tables

# DECLARATION OF AUTHORSHIP

I, Dawn Louise Robins

declare that the thesis entitled

**Evaluating the Long Term Impacts of Transport Policy: The Case of Passenger Rail Privatisation**

and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- where I have consulted the published work of others, this is always clearly attributed;
- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- none of this work has been published before submission,

Signed: ……..

Date:……

## Acknowledgements

The author would like to thank Prof. Steven Pinch for his support and guidance throughout the research process and Prof. John Preston for his time and technical help with the focus and direction of the research.

The author also wishes to acknowledge the inclusion of data originating from, and published by, Dr. Andrew Smith for his research on costs in the rail industry (Smith 2006). This data has been updated and manipulated for the purposes of this research, with permission from Dr Smith.

## Abbreviations

| | |
|---|---|
| Ac | Actual |
| ARIMA | Autoregressive Integrated moving Average |
| ATOC | Association of Train Operating Companies |
| BR | British Rail |
| BRB | British Railways Board |
| BTC | British Transport Commission |
| CBA | Cost Benefit Analysis |
| Cf | Counterfactual |
| CLR | Classic Linear Regression |
| CNR | Canadian National Railways |
| COSIMA | Cost Management Analysis |
| CP | Control Period |
| CPR | Canadian Pacific Railways |
| DfT | Department for Transport |
| DLR | Docklands Light Railway |
| DTp | Department of Transport |
| DW | Durban Watson |
| EMU | Electrical Multiple Unit |
| EWS | English, Welsh and Scottish Railways |
| Fc | Forecast |
| FORSYS | Forecasting Systems |
| GDP | Gross Domestic Product |
| GNER | Great North Eastern Railway |
| HLOS | High level Output Specification |
| HMRI | Her Majesties Railway Inspectorate |
| HoC | House of Commons |
| HSE | Health and Safety Executive |
| HST | High Speed Train |
| ISU | Infrastructure Maintenance Unit |
| ITS | Institute for Transport Studies |
| Km | Kilometres |
| L&SE | London and South East |
| MEA | Modern Equivalent Asset Valuation |
| MCA | Marginal Cost Analysis |
| MCB | Management Consortium Bid |

| | |
|---|---|
| MD | Managing Director |
| MR | Modern Railways |
| NPV | Net Present Value |
| NR | Network Rail |
| OfQ | Organising for Quality |
| OPRAF | Office of Passenger Rail Franchising |
| ORCATS | Operational Research Computerised Allocation of Tickets to Services |
| ORR | Office of the Rail Regulator |
| PDFH | Passenger Demand Forecasting Handbook |
| PE | Privatisation Effect |
| PJ | Passenger Journeys |
| PKm | Passenger Kilometres |
| PR | Periodic Review |
| PSO | Public Service Obligation |
| PTA | Passenger Transport Authority |
| PTE | Passenger Transport Executive |
| R&D | Research and Development |
| RevPKm | Revenue per Passenger Kilometre |
| ROSCO | Rolling Stock Leasing Company |
| RPI | Retail Price Index |
| SOE's | State Owned Enterprises |
| SoFA | Statement of Funds Available |
| SRA | Strategic Rail Authority |
| TKm | Train Kilometres |
| TOC | Train Operating Company |
| TOU | Train Operating Unit |
| TRU | Track Renewal Unit |
| TSC | Transport Select Committee |
| TSGB | Transport Statistics Great Britain |
| WAGN | West Anglia Great Northern |

# 1 Introduction

## 1.1 Railway Research

The railways in Great Britain have recently celebrated their second centenary and in typical British style this was greeted with grumbles about rising fare prices (Savage, 2009), service provision and reliability (Kassam, 2006) as well as political unrest over increasing costs and instability concerns of franchise agreements (TSC, 2009b). The railways have always attracted a mixture of emotions from the romantic to the ultra-critical and in some instances the reporting has also tended to be conveyed under these terms. Rail research covers broad topics such as history, engineering and technology, economics, social benefits, political constraints and health and safety and is never confined to one discipline – geography, social policy, history, economics, politics and transport. This enables the researcher the opportunity of a diversity of methodologies and empirical standings from which to build.

Considered a superior mode of transport compared to road and canal in the early days it was expected to develop and profit accordingly but, rather than a steady rise in growth and popularity, the railways have experienced a rollercoaster of highs and lows and ownership and management structure has appeared to have changed more often than the Governments that have tried to control them. It is this flux that the railways have found themselves in that makes researching them both interesting and complex. Studies of the rail industry are sometimes conflicting and the wide choice of variables to consider and methodologies to utilise mean that a definitive agreement is rarely reached.

The latter part of the twentieth century saw widespread governmental policy change, coming after years of governmental expansion and increasing state ownership, in the form of privatisation. Main utilities, communications and large manufacturing and services all felt the impact of market forces and separation of vertical and horizontal component parts. The railways were not spared this seemingly continuous onslaught of industry fragmentation although, as one of the largest and considered most unwieldy of industries, plans were continually shelved until the next government term. The modern railways, post-World War 2, have been the subject of some of the broadest scope of research with the privatisation initiative seeing some of the most prolific research of any industry sector. Interest in the railways is often spurred on by events that occur and the Hatfield crash is one such event that has been seen from technological perspectives (Cannon et al., 2003, Smith, 2003), cost implications (Kennedy and Smith, 2004), politics (Glaister, 2004), health and safety (Jeffcott et

al., 2006, Evans, 2007) and social culture (Hiscock et al., 2002). The privatisation initiative has also been approached from a political (Dobek, 1993, Shaw et al., 2003), economic (Smith and Wheat, 2007, Smith, 2006, Preston, 2008b), social, employment (MacKinnon, 2008) and efficiency (Fraja, 1991, Cowie, 2009) perspective.

The majority of studies look at specific time scales or events and concentrate on an aspect of railways – freight, infrastructure, fares and costs, - as to do otherwise would render the methodology too complex to employ and provide a less rigorous analysis. An analysis of the impact of privatisation on the entire passenger network over a long term period is something that has not yet been achieved and it is here that this research aims to address the balance. It has been 15yrs since the privatisation of the network was carried out and this period has seen many changes to the organisational structure as the network 'settled' into its new ownership status.

This research takes the time scale of the run-up to privatisation, the transitional period, and the post privatisation period as being 30yrs from 1979 to 2009 and covers the political and economic platform from which the privatisation initiative was initiated and the changes that have taken place. How the peripheral events have impacted on the railways organisational process and how long these effects have remained prevalent will be looked at as part of a long run trend analysis and ex-post cost benefit analysis (CBA). Taking account of the broader issues of the social, economic and political challenges that have taken place will help to give this research clarity and help it evolve into more than an economic analysis. This thesis, primarily, is not an exercise in econometrics, but uses econometrics as a means to an end. It is the narrative that surrounds the CBA that adds depth of understanding and provides a plausible explanation for the results of the CBA.

The aim of this research is, therefore, to look at the economic, political, social and cost implications that have been part of the platform to privatisation and to carry out a cost benefit analysis using the relevant data to try and ascertain what the main benefits and costs have been, and where these costs can be attributed. The research develops a model, using the available data variables, to predict the forecast for passenger kilometres after privatisation and compares this trend to what has actually happened in the industry. Using a counterfactual scenario – a continued nationalised industry – the model calculates the impact of the privatisation and the benefits and consumer surplus that have been identified. The costs of running the railway – from both a nationalised and privatised scenario – are calculated and the costs attributed to Users, Non-Users, Operators and the Government.

Defining the structure of the thesis and what can be included as evidence has been a constantly evolving exercise. The complexity of the industry coupled with the large amount of available research has provided immense resources from which this research can draw. The following chapters have been designed to tell a narrative of modern rail whilst providing a clear and balanced view of the impacts and strategies as they occurred.

The literature is reviewed first and offers explanations for the political and economic processes of nationalisation and privatisation and covers a brief history of the rail industry. The methodological options of cost benefit and other economic analyses are discussed as part of the methodology chapter and the proposed methodology for this thesis discussed. To understand the impacts on the rail industry and to choose the variables that will be used to ascertain the costs and benefits of the privatisation initiative there is a discussion on the trends that have directly and indirectly affected the rail patronage. These include the identification of trends in cost, quality and patronage for passenger rail and the disaggregated trends in ticket type and sector. The trends in alternative transport modes – car, air and bus – are also analysed with the view of finding comparable trends and possible impacts on rail patronage along with the environmental and demographic trends. The aim of this section of the research is to identify the variables that will be used in modelling the impacts on rail patronage. It is here that the availability of data, its ability to be collated and manipulated over the 30 year time frame and capacity to develop a plausible answer to the rise in passenger rail patronage will be explored.

The analysis of the data is separated into two chapters – developing the model for ascertaining the welfare gains, and an analysis of the cost impacts. The process of developing and defining the model, that best describes the impacts on privatisation, is given in the first analysis chapter where the counterfactual scenario is also developed. Costs and benefits are disaggregated through the dialogue and brought together to identify the specific impacts in monetary terms.

The research concludes with a discussion on the findings and the methodology used, highlights areas of further work and alternative methods. The conclusion chapter of this thesis summarises the findings and processes and identifies the contribution that the research has made to the current literature.

This thesis is ultimately a story of a journey through the last 30 years of the rail industry and attempts have been made to view this time period with an holistic approach thereby

encompassing the vast array of impacts and events that have occurred. It is fitting, therefore, that this thesis starts with an overview and grasp of the political and economic theories and ideologies around public and private ownership before relating this through a background to the rail industry that outlines the major events that have helped to shape its future.

# 2 Literature Review

## 2.1 Introduction

The time scales covered in this research warrant an understanding of the backdrop to the topic. The history of the railways has been written about many times from different political, economic, and historical viewpoints but the privatisation of industries across the globe is a significant political and economic occurrence during the 1980s onwards. The first section of this literature review will examine the process of privatisation - the theory, ideologies, methodologies, and possible reasons for applying it to the railways - and how this process has evolved and developed in recent years. The second section will look at the modern history of the railway industry in Great Britain and relate the theories and ideologies around industry ownership to the timescales of the research period to determine why it was deemed necessary to privatise it. Finally, it is necessary to understand what aspects of rail privatisation have already been covered, what methodologies were chosen and the depth and breadth covered in this research. The review of the literature will therefore cover three main areas:

1. An understanding of the ideology and theory of privatisation and the merits of privatised firms compared to nationalised firms and how this relates to the rail industry in Great Britain
2. The modern history of the railways and the controversy over the privatisation initiative including the politics, economics and logistics of privatising the railways
3. The privatised rail industry – a discussion on the constantly evolving structure and the impacts that have shaped it.

There is a vast literature on privatisation, but for the purposes of this thesis the literature included in this review is, apart from the initial discussions on the theory of privatisation, specifically related to rail privatisation and business organisation. Although privatisation is instigated by governments for reasons of politics and/or economics (Opper, 2004, Dobek, 1993, Bradshaw, 1995), it is still a method of company structuring and financing. There may be an argument for determining that privatisation was a natural outcome of global business and economic processes (Foster, 1994).

The literature on specific methodologies for accounting for changes in demand and modelling costs and benefits is abundant. To cover the entire spectrum of literature applicable to this research within one chapter would not be conducive to achieving a concise yet

comprehensive study, therefore, the research on methodology and the current findings of research using economic modelling have been reviewed within the methodology chapter. This will enable a full discussion on the methodologies that have been developed for this research.

## 2.2 Privatisation versus Nationalisation – the theories and ideologies of ownership

### 2.2.1 Introduction

Privatisation was first used as a 'jargon' term developed in the 1970's along with many other economic 'buzz-words'. Unlike other economic terms it appeared enduring enough to last, turning into an internationally recognised slogan and having a considerable impact on the politics and economies of many countries around the world. Privatisation has no distinct definition, meaning many things to many people, but a broad general explanation involves introducing some form of private ownership into public enterprise (Hood, 1994, O'Loughlin, 2005).

Privatisation is essentially a product of an ideology that saw a political break from social democracy (Else, 1994). Sometimes referred to as Thatcherism, or the New Right, this change of political direction was not necessarily a Conservative policy – other Conservative Governments had been happy to support a welfare state and largely publicly owned industry sector – therefore it can be argued that the change in policy may have occurred in some form or another regardless of who had been in power at the time and the change in political stance is seen as a Neo-liberal turn (Shaw, 2000). Privatisation, during the 1980s, was also prolific, in occurrence if not method, across the western world therefore could not be construed as a policy specific to a political party (Hood, 1994). Privatisation also comes in many forms and is not seen as a 'one size fits all' solution but rather a set of ingredients that can be picked from to achieve the best recipe for success. The interesting concept here is the 'success' element, considering how many privatisation initiatives have been perceived to have a mixed and sometimes negative impact (Ivaldi, 2008), and how and why the methods are chosen.

The literature on privatisation is descriptive yet fails to provide an answer to the fundamental question 'why did privatisation of industries occur at roughly the same time across the western world?' Initial findings also show that privatisation – by its very nature – follows nationalisation yet the literature focuses on the privatisation initiatives rather than aiming to explain why nationalisation took place in the first instance. There is also the concern that the literature, rather than concerning itself with what has not been discussed looks to pigeon hole

the theories into themes and categories in an attempt to further the knowledge and understanding. Some of these theories are discussed here.

### 2.2.2 Privatisation methods and Impacts

It appears that the majority of the literature on privatisation concerns itself with two main issues: the methods of privatising the industry (Boycko et.al. 1996), and comparisons of efficiencies between state owned and private firms (González-Páramo and De Cos, 2005, Boardman et al., 2009). The descriptions of why privatisation took place can be seen as fitting into three theoretical stances: efficiency, political, and budgetary (Rosa, 2010).

Efficiency theory is backed by many studies that explain how large nationalised firms are inefficient when compared to profit driven private firms (Pollitt, 1995, Letza et al., 2004, Marques, 2008). The political explanation looks to privatisation as a political ideology that aims to bring sweeping changes and benefits to the economy, yet, if this was the case, then privatisation would surely have been the norm in the first instance? The third theory explains privatisation as solving budgetary needs. This theory also has concerns as privatisation is neither quick, nor cheap, to carry out and many far simpler revenue generating schemes could have been instigated instead.

According to Feigenbaum and Henig (1994) there were two main perspectives to privatisation theory: administrative and economic. The administrative perspective presents itself in the form of a series of 'options' that are used to pick-and-mix from in order to achieve the privatisation objectives. These tools can include deregulation, liberalisation, contracting, franchising and asset sales. Which tools are chosen will be dependent on the degree of competition, social responsibility, available information and the organisational capacity of the government (Ivaldi, 2008). The economic perspective 'presents privatisation as the inevitable consequence of neoclassical truths that dictate the retraction of a bulky, intrusive, and parasitic welfare state' (Feigenbaum and Henig 1994 p118).

The tools for privatising industries are classified as: divestiture, liberalisation and privatisation, which, according to Else (1994) are all variations along a similar theme (Else, 1994), although it is the term privatisation that has consistently been attributed to the process .Divestiture usually applies to the sale of parts of an organisation; both poorly performing and non-vital or those worth more to a potential buyer than in their present position. British Rail divested many of its subsidiaries during the 1980s, prior to the eventual privatisation of the core

business: Hovercraft in 1981, BR Hotels in 1982-84, Sealink in 1984, to name just a few. Liberalisation, (deregulation) tends to be concerned with the opening of a market to full competition. In the case of British Rail, liberalisation has come later in the form of open access rights rather than at the start of the process as with the bus industry. Privatisation is the sale of public goods into the private sector – with or without competitive objectives. Privatisation can be carried out in various ways – (i) direct sales of parts or whole industries, (ii) flotation on the stock market (British Telecommunications and Railtrack were an example of privatising by stock market floatation), (iii) or contracting out of services i.e. catering, maintenance etc. (now a widely used practice by Local Authorities). Privatisation offers the advantage of structuring the competitive part of the industry whereas liberalisation, although it can precipitate changes, can also lead to the subsequent structure becoming unpredictable (Newbery, 2002). The rail industry in Great Britain has used all three methods of privatisation over the 30 year span of this research, in what has become one of the largest public reorganisations ever carried out.

Although the literature on nationalisation is less prolific than that on privatisation it is important to look at what has been written in order to understand the differences between a nationalised economy and a privatised economy. Public enterprise has been seen in varying degrees throughout the Western world and has been set up for reasons of economics, politics and logistics; although reasons offered to explain the emergence of public enterprise remain descriptive rather than explanatory (Hood, 1994). Main utilities such as Gas, Electricity and Water; communications such as mail and broadcasting; and heavy industry such as coal and steel have been the main sectors to be publically owned. The formation of public enterprise has varied across countries with France having had a large public sector whereas Sweden maintained only a small sector. Public enterprise can also be run in a variety of ways, from great monopolies such as British Gas, to metaphytic competition, such as broadcasting. Public enterprise enjoyed a strong position within sound economic practice and was expected to grow throughout the 20$^{th}$ century as it provided security for both the workforce and consumer, and generated income for government policy expenditure. Public enterprise was also advocated throughout the developing world being seen as a key ingredient to economic growth and prosperity, and in many instances was a condition of grant aid. It came as a surprise to everyone when public ownership practise was challenged by the concept and then practise of privatisation.

In many instances privatisation is motivated by property rights theory (Alchian and Demsetz, 1973), which suggests that in competitive environments state-owned enterprises (SOEs) are less productive and less profitable than their private-sector equivalents (Boardman et al., 2009). Property rights theory concerns itself with the concept of ownership and ability to control. Boardman suggests that the empirical support for property rights theory is three fold;

1. comparisons of samples of state-owned firms with private-sector firms in similar circumstances, or "like-like" studies (Pollitt, 1995)
2. "before-after" performance studies
3. "before-after" CBAs of specific privatisations (Pollitt and Smith, 2002).

There is also empirical evidence of property rights theory being tested as individual case studies where changing property rights are directly influenced by politics in order to achieve the desired political outcome (Opper, 2004). The issue here tends to surround the different interest group and major stakeholder disputes that run, not only against the political will but, against each other (Libecap, 1989). The purpose of these case studies underlines the problem of the underlying merits of the different property right theoretical approaches – there is not a one-size-fits-all approach that can be taken. The theory of property rights may be applied to privatisation initiatives, but the outside influences of the social, political, economic and global landscape will affect the ability of the model to explain progress on both small and large scale privatisations (Opper 2004).

With regard to the railway industry, Boardman (2009) studies the Canadian railroad post privatisation and compares, through cost benefit analysis (CBA), the performance of Canadian National Railways (CNR) to Canadian Pacific Railways (CPR) – continually privately owned railroad – and finds that the privatisation of CNR has improved performance and generated efficiency gains in the region of approximately $4.3bn (Boardman et al., 2009). Contrary to both Boardman's research, and property rights theory in general, Caves (1980) found no evidence of inferior performance when he studied the railroads performance prior to privatisation (Harvey, 2006). Although the methodology for comparison differed: Caves used a 'Measurement of Total Factor Productivity' and Boardman uses CBA: it could be said that although public ownership did not hinder productivity levels to the degree that property rights theory suggest (Caves and Christensen, 1980), once privatised, the railroad exceeded expectations and provided the competition necessary to improve performance (Boardman et al., 2009).

Although Property Rights Theory may provide an incentive to privatise there is also a case to consider that the change of ownership between public and private can also give rise to Principal-Agent problems. The principal-agent problem develops when a principal – in this case the Government – creates an environment in which an agent – the franchised operators – has reasons to align its interests with those of the principal, typically through incentives – in the case of rail these are mainly in the form of subsidies. Principal-Agent Theory deals with a specific social relationship – delegation. By nationalising an industry the principal (Government) takes control of not just the industry and the direction the industry should take, but also the information and knowledge of how the industry is run and where necessary changes should take place to align it with policy (Marsh, 1991). Privatising an industry involves not just a change of ownership but also delegates the control of the information and knowledge and the decision making process on operational policy. This scenario creates the Principal-Agent problem and the solution for the principal can be found in regulation and legislation.

Principal-Agent Theory highlights the natural human behavioural aspects of industry and the self-interest of 'Actors'. Actors seek to maximise their personal welfare and to profit at little cost to themselves. If the theory is taken in its most basic form it would stand to reason that the Franchised Operators would run the railways for profit and any routes that did not turn a profit would be cut. Although the principal wishes the agent to flourish, they will also want to make sure that the service provided is in line with their objectives. To achieve this they will stipulate the quality and quantity of service provision and incentivise the agent by providing subsidies and penalties – regulation. Another configuration reducing the possibilities of agents reducing service for self-interest profit is the presence of multiple agents, which creates more of a market-like structure, adds the incentive of competition, and feeds the desire of agents to succeed, thereby reducing the opportunities for reneging on contractual agreements (Braun 2003).

Braun (2003) calls this 'moral hazard' 'shirking' (Braun 2003 p304). But he also suggests that this can be 'collective' in the sense that both agent and principal are capable of this behaviour. The reasons for changing ownership are usually multiple and there can be reasons for the principal to renege on contractual agreements if the agent out-performs, or the principals policy no longer aligns with the contractual agreement (Braun and Guston, 2003). With regard to the railways, the mis-alignment of objectives and therefore performance outcomes of privatisation are discussed by Heritier (2002). Heritier questions whether public-

service goals of accessibility, security, continuity and affordability are still in place in the countries that have undergone reform and finds that the Principal-Agent problem exists in many instances (Burton, 1987). Heritier used policy objectives as a measure of performance and found safety under privatisation had become worse and that poor maintenance of the infrastructure was often at fault. Profit over service was therefore a problem for the industry and a reason for increased regulation and public control (Héritier, 2002).

Prosser (2005) found that the problems with regulation was partly due to the essentially political nature of regulatory relations (Prosser, 2005), which make it difficult to tie down regulatory discretion in ways which resemble contractual relations (Feigenbaum and Henig, 1994). Interestingly, he also questions who the principal and agent are – shareholders, creditors and suppliers are all important stakeholders and essentially the Government serves the public and the public are served by the railways. This scenario provides a bilateral relationship that adds to the complexity of ownership and responsibility and, argues Prosser, is an area that has little empirical research to provide possible solutions for implementation (Feigenbaum and Henig, 1994).

### 2.2.3 Government and Market Failure – reasons for policy change?

The theories outlined above are not the only reasons for transferring public properties to the private sector though and it is suggested that in order to understand the concepts and methodology of privatisation it is necessary to understand why public enterprise occurred in the first instance. This may then shed some light on why privatisation was not always welcomed by either the public or the trade unions in regards to the railways. Unfortunately, there is no developed body of theory to explain why public enterprise develops, adapts, or behaves generally, as the majority of literature remains descriptive (Hood, 1994). Particularly insightful is the work of Hood (1994) which offers three broad explanations for public sector operations. These encompass economic, political and social situations, describing public enterprise as:

1. A functional state response to market failure
2. A product of international competition, nationalism and development of the modern sovereign state; and
3. A product of domestic politics.

Resembling the ‘Whig Tale’ (Hood 1994) of regulation, public enterprise can be explained as a ‘functional policy response to the inherent shortcomings of capital or product markets’ (Hood

1994 p39). This explanation assumes that private enterprise is the normal method of social production and that public enterprise only occurs when some sort of market failure occurs. Tautologous or overtly simple, for this to be a convincing argument there must also be an explanation as to why public enterprise is the only solution able to overcome the apparent market failure. One sphere where this may be explained is through reference to property rights. Owners can appoint or dismiss top managerial level employees; regulators can close a company down, but only owners can decide to keep a company running. It is here that governments may wish to intervene in the ownership and running of an industry if the need for greater control would enable social responsibility or political international advancement. Regulation may enforce these attributes in theory, but if a company is neither willing nor able to conform in practice, government ownership or intervention may be seen as the only viable option. There is also the issue of bankruptcy and takeover. Although the Competition Commission[1] can prevent any takeovers or mergers that will produce a monopoly industry they have less control over bankruptcy and foreign takeovers unless competition will be contravened.

Although the recent trend has been to privatise nationalised companies, the recent case of the troubled Northern Rock Bank is a good example of how the market failure and the need to protect consumer, customer and public interests have led to nationalisation. Nationalisation in today's market does not necessarily mean continuous public ownership, but rather a necessary breathing space for the market to stabilise before some sort of privatisation or return to original investors with regulatory rules imposed. This argument for ownership and property rights also highlights the need for control; or indeed the need to give control away.

Hood's second argument for nationalisation is nationalistic (in the true sense) since it seeks to promote a sense of 'closing ranks' and 'flying the flag'. By warding off foreign capital investment and promoting nationalism the state engenders feelings of power and joint ownership; and therefore responsibility. There have been many cases where nationalisation has come about for this reason. The Belgian railways purportedly nationalised the network in 1834 to ward off the threat of Dutch domination and Britain nationalised the aero division of Rolls Royce to maintain an international competitive advantage. Austria nationalised many abandoned German industries to stop them being confiscated after the Second World War and France used nationalisation as a response to empowering the nation after German

[1] Replaced the Monopolies and Mergers Commission in 1999

occupation. This argument works well for many cases of nationalisation but in many instances, although this appears to be the foundational argument, it is actually a secondary outcome. There are many countries with large national industries where international threat is also minimal; such as Sweden and the USA (Kay, 1987).

If this rationale for nationalisation is to be seen as a cohesive argument then it must also explain why economic sovereignty needs to be pursued through public ownership rather than other 'soft' options such as national contracts and regulation. National industries are less transparent than subsidised industries, and the transfer of ownership can have a faster impact on the economy than other policy implementations, but this still doesn't explain all the instances of nationalisation that have taken place.

These considerations suggest that the third reason for nationalising companies may well be closer to the mark, if not economically then definitely politically. By looking at the social and domestic political forces at play the more subtle reasons for ownership transferral can be found. Nationalised industries are seen to be 'safe' in terms of providing a service to all at a cost that is achievable to the public. Indeed, main utility services such as electricity and communications are expensive to provide and maintain and not seen as commercially viable to rural areas. This approach to nationalisation may be seen as a response to popular demand for the policy by the public, business lobbies and trade unions. It is a way to privatise profits and socialise losses according to Marxist views of capitalism (Boycko et al., 1996a). Reasons for nationalisation can also be for reasons that Hood calls 'unmentionables'. Nationalised industries are seen as 'waiting rooms' for politicians whom governments want to 'move on' or bury. The public funds generated by nationalised companies are convenient for governments to use as a reward for supporters, key plants can be located in marginal areas, and then further aided by business decisions such as expansion or closure that can be timed into the political cycle. Nationalised industries have often been used to soak up unemployment and have been seen as being over staffed both at the lower and managerial levels (Boycko et al., 1996b). Historically, working for a nationalised company can provide job security and there is often an abundance of low paid menial work.

Nationalisation can therefore be seen not just as an economic solution to a market problem but also as a social and political tool. These reasons can also be turned around and used to argue the case for privatisation because if nationalisation takes place when there is evidence of market failure then it follows that for an industry to be privatised there must be evidence of government, or regulatory, failure. This was seen in the 1990's in the ex-communist states

with the mass disposal of ex-communist industries into the private sector, arguably a classic case of government failure. But not all ex-communist countries engaged in such systematic privatisation as Russia and the former Czechoslovakia. Privatisation also took many other forms as some governments privatised small areas of an industry and others the entire industry. Methods of privatisation also differed between country and industry and included management buy-outs, trade sales and also stock market floatation's (Hood, 1994).

Market failure could also be rectified with technological innovation and advancements which would mean that privatisation is an effect of a reduction in market failure, not a response to government (regulatory) failure, but rather showing that the theory was, ultimately, successful. This is particularly apparent with the communications industry and the development of satellites and digital media enabling relatively cheap and versatile communications and allowing for competition within the industry. Technology, in particular computers, has enabled previously large and unwieldy organisations to splinter, generating competition, and allowing for regulation to be effective and easily monitored.

It is here, with the introduction of regulation that the concept of privatisation and nationalisation appear to blur. Although many companies are sold into the private sector, the 'property rights' may not necessarily be completely transferred. Regulation of previously Government owned industries appears to increase over time (Majone, 1997). Although this is essentially the solution to ensuring consumer protection from privately owned natural monopolies there is also evidence that regulation can inhibit management decisions, prevent companies from expanding and continuing economic growth, and form a control not previously evident in the nationalised industry (Kay, 2000). Boycko found that for privatisation to work an effective stabilisation policy also needs to be in place that depoliticises firms and controls political discretion (Boycko et al., 1996a). The majority of the criticisms lie with the pricing of goods and services and the widely used formula of RPI-X to cap prices below the Retail Price Index (RPI).

From the evidence put forward it could be argued that privatisation and nationalisation are just forms of financial, organisational and management structure that occur through cycles (Gwilliam, 2008). Foster (1994) argues that the failure of nationalised industries to maintain earlier productivity levels led to declining profitability and stagnant – if not declining – service quality and eventual economic failure (Foster, 1994). The reason for nationalisation to take place in the first instance, from an economic point of view, can be the reverse. Foster believes that the owners of the railways prior to the First World War could have prevented the

eventual nationalisation of the industry but made little effort to do this. Foster believes the regulation and control of the railways was inefficient and the owners, faced with possible bankruptcy or re-financing, saw nationalisation as a way of ensuring the railways continued as a main transport service (Foster 1994 p490).

When Gwilliam (2008) looked at the regulatory cycle of the Bus industry he found evidence to suggest that there is a clear continuous cycle through private supply – unregulated private monopoly – regulated private monopoly and then – nationalisation before restarting the cycle again (Gwilliam, 2008). Preston (1999) also considered this cycle as a feature of the rail industry (Preston, 1999b). The drivers for this cycle, and indeed change in general, seems to be around the behaviour of suppliers, the unrealistic aspirations of politicians, and whose visions ensure stability is unachievable (Gwilliam 2008).

Each ownership cycle will occur depending on the social, political and global situation of the time. For example, the post war era saw a trend towards nationalising companies for the reasons explained above but when the economy improved, and outside threats reduced, so did the governments' need to reduce spending and, the trend reverses towards privately owned companies. Socially necessary utilities such as electricity and gas will require public ownership to install due to the scope of the infrastructure and initial outlay, yet once in place the actual running of the operation can be managed from the private sector and regulated to ensure fair competition between operators and fair prices for the consumer. Regulation is deemed important to ensure the balance between profitability, price and sustainability are maintained and almost all services are now regulated to some degree[2].

Although the argument for privatisation being a fairly natural economic event seems fairly robust, the privatisation of firms during the Thatcher years was not always greeted particularly enthusiastically, although there is evidence that opposition was loud but lacked enthusiasm (Crompton and Jupe, 2003, Ivaldi, 2008). This may have been due, in part, to a natural resistance to change as well as the sense that the privatisation was not necessarily carried out for economic and social benefit but rather had a political agenda that may have impacted on the success of the venture (Glaister, 2004). It is therefore important to consider to a greater degree the political climate of the era and to see if there is a correlation between the economic and political policies that are directly related to the Thatcher government.

[2] An example of a deregulated industry that 'caused' the recent recession is banking!

### 2.2.4 Thatcherism, the New Right, and Political Ideologies

The privatisations undertaken throughout the 1980s' in the UK have also become known as Thatcherism. That said, Thatcherism in itself is a controversial term that means different things to different people. Described as incoherent and inconsistent (Gamble 1989), Thatcherite policy was, nonetheless, a radical change that has been compared to the watershed of the 1940s settlement and the conception of how the public and private sector relationships operate (Gamble, 1989).

Prior to the Conservative Governments led by Margaret Thatcher, the UK economy had operated within what had been seen as a fairly balanced public and private ownership system where the majority of large social welfare industries were publically owned and the majority of trade sectors were privately owned. This system had evolved from the 1940s settlement and had proven to be durable both economically and politically. Education, housing, health and utilities were developed and expanded helping to rebuild the country after the Second World War. All the time there was prosperity and growth the structure of the economy was left alone but as Britain started to lag behind other westernised countries the nationalised policies began to be questioned (Gamble, 1989). The Global recession and the Oil Crisis of the 1970s revealed the cracks in the economic performance of Great Britain and the Government were left trying to find ways of repairing the economy whilst supporting the cost of the recession. Rising unemployment, a heavily unionised workforce and repeated economic and political crisis could arguably have laid the foundations for the radical and pronounced ideological stance of the Thatcher led Conservative Party.

Thatcher's rejection of a politics of consensus and her embrace of conviction politics were unusual for a Conservative Government (Gamble 1989) although the claims appeared to be more radical than the policies themselves. Not once in either the election manifesto or the run up to the election did the Conservative Party commit to privatisation as a tool for recovery. What was committed to was the adoption of more commercial practices within the nationalised industries. Privatisation was not a policy chosen to rebuild Britain but rather a policy that was developed after the successful sale of a few small publically owned assets (Burton, 1987). Privatisation policy was only set out during 1983-4 and as with most government policies it was improvised, amended, and reactive to the changing social and economic climate as well as the political opposition.

Once privatisation became an accepted and embedded policy the Conservative Government sought out larger and more radical industries to privatise (Feigenbaum and Henig, 1994) and

innovative ways of achieving increased funds to the Treasury from the sales and a reduction in the costs of subsidy and social responsibility (Gamble 1989). Privatisation was quickly seen as a political tool to buy votes by selling low to 'friends' and reducing the amount of 'blame' that could be placed with the Government for failure to achieve objectives (Hood, 1994). When transport was considered for privatisation the problems appeared to be greater in terms of methodology and a fierce opposition was found from both the Opposition Government and the general public (Gourvish, 2002a, Wolmar, 2005).

One of the main problems with the privatisation of transport was the size and extent of related services that were involved. This, coupled with the social responsibility of running a transport network, and the huge deficit between income and expenditure, meant that a selection of privatisation tools needed to be used along with incentives – in the form of subsidies – and control – in the form of regulation. The potential for competition *in* the market was therefore constrained through regulation at the time of the sale, but competition *for* the market became the incentive (Shaw, 2001).

Thatcherism and transport are also worth considering outside of the privatisation policy framework. Transport – specifically public transport – was not something that the Conservative Government wanted to promote. The policy was more towards car ownership and road building and increasing the 'great car economy' (Docherty and Shaw, 2003). The 1980s saw the largest increase in car ownership since its invention and a general move towards equality with women becoming the largest growth market (car use is discussed at length in the Industry Trends in chapter 4). Large road building projects and the continued motorway development were driven forward in the Thatcher years. The Conservatives promoted the idealism of empowering people with property rights and this extended out from house buying to car ownership. With this increase in car use came the concept of congestion and the associated 'road-rage' of frustrated drivers and the introduction of research into a new geography paradigm; Automobilities (Urry et al., 2005).

It would be unfair to suggest that the Conservatives were the only Government to support car use, all Governments had supported the concept of personal travel and road building had been prolific since the 1950s. In many respects it is a feature of the urban sprawl and 'dormitory settlements' (Headicar, 2003) that gradually became the legacy passed to governments, but it is the Conservative attitude of negativity towards public transport and the unwillingness to invest that stands out against previous governments. Political negativity also combines with social status and consumer behaviour to further alienate public transport – it

was not considered a vote winner and therefore not promoted – these issues are explored further in this thesis in both the literature review and the transport trends (Maio et al., 2006).

The practicalities of political will are very apparent in regards to transportation. The Conservative idealism was showing signs of cracks by the time the Labour Government came to power and the historical under funding of public transport and subsequent sale or deregulation had not engendered the public to switch from road to rail or bus. The Conservatives ideal was for car ownership whereas the New Labour policy moved towards sustainable transport. Neither of the policies is without fault, and putting them into practice has, more often than not, been much more complicated that the election promises that were delivered. For the Labour Government, attempting to get the car owning and independent population to change their behaviour coupled with trying to increase the service of a public transport infrastructure that was organised for profit rather than providing a social service proved far more difficult than their manifesto had described (Docherty and Shaw, 2003). All this will have impacted on the demand for rail and needs to be accounted for when analysing the results of this research.

It has been argued that privatisation is a concept and set of policies that are highly diverse in scale and scope. The term privatisation is in dispute and the ideology behind the concept complex. When privatisation as a political tool is considered in transport – and specifically rail – the external influences of consumer behaviour, political opposition, modal shift and changing environmental and economic demographics all play a major role in shaping the changing industry structure. How the Thatcherite policies (although by the time of rail privatisation it was John Major in control) influenced the privatisation initiatives and how external influences shaped them will need to be discussed in order to understand any impacts that may have influenced the changing demand for rail over the time period. The following section looks at the actual process of privatising the railways and takes account of the events leading up to, and after, the initiative.

## 2.3 A Potted History of the Railways

The railways were 'born' on the 21st February 1804 when Richard Trevithick's pioneering engine pulled 10 tons of iron over a 30 mile track – although it was the first run of George Stephenson's Locomotion that pulled the train on the Stockton to Darlington line in 1825 that is best remembered as the start of the railway age. By 1845 there were approximately 2,400 miles of track across the UK and the railways quickly became the preferred method of

transport for moving first freight and then passengers as the industrial revolution was by now in full swing (Héritier, 2002). Canal transportation was slow and unpredictable and routes were sporadic and constrained to lowlands near rivers, whilst coach travel was dangerous, slow and could only transport small items at a time. The train, on the other hand could pull large loads, and as long as the track didn't run out, could be used to transport goods for miles over differing terrain. The first half of the nineteenth century saw the transformation of the lives and livelihoods of Britain's people as the rail network stretched from Plymouth to Aberdeen enabling fast and effective movement of first goods, then people (Wolmar 2005).

Built by the wealthy industrialists of the time, the rail network was not strategically planned as a passenger network but rather to link factories and ports and large urban market centres. With the realisation that passengers could be moved from one location to another at a profit, tracks began to be laid side by side in direct competition with each other, and whilst each new line needed parliamentary approval, the government of the time had a limited interest in the emerging network that was being created and very few applications were turned down (Glaister et al., 2006). The oligopolistic competition of the early years gave way to a more consolidated industry as the more profitable rail companies took over the weaker ones, thereby reducing the number of privately owned rail companies and creating a monopoly situation for passengers and freight users in many areas. Many of the newly forming rail companies also maintained a monopoly within the industry sector as they owned both the infrastructure and locomotives they used.

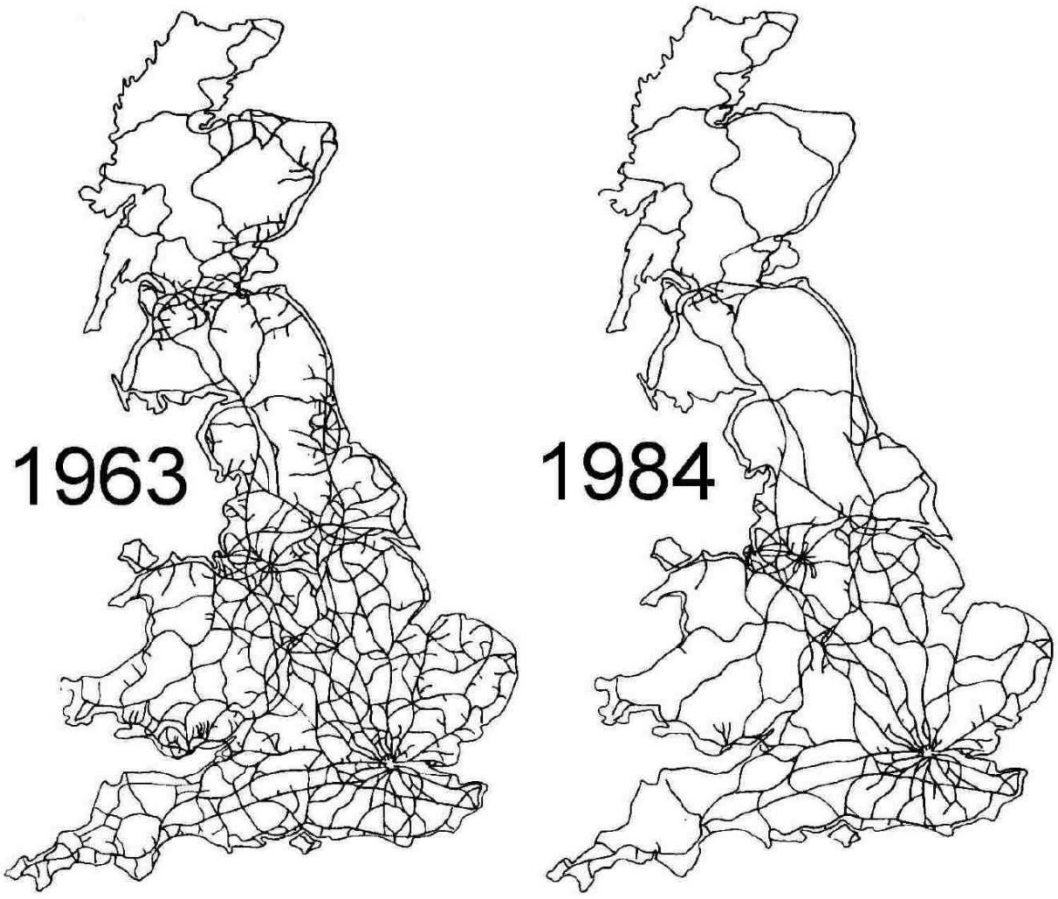
In terms of transport share, the rail industries 'Golden Age' was short lived, if it ever existed, as the railways had an ever falling percentage of overall transport share and went from an almost total monopolisation of all passenger and freight movement in the 1850's to no more than 6% of the total share at the point of privatisation. Government intervention as early as the 1840 Railway Regulation Act entailed regulating the monopolies in each area and insisting on specific health and safety issues to be addressed. These early interventions by the Government also heralded a concern for the consumer, specifically the less economically advantaged consumer, by enabling rail travel to be accessed by all. These 'parliamentary trains' (Harris and Godward 1997) became a provision of service and provided at least one return trip per line each day at around 1d a mile, although many of these carriages had no seats or windows and led to the outcry that animals were treated better than people. The 1844 Railway Act also gave the government the option to revise prices and the right to

compulsory purchase after 21 years; although these provisions were never taken up they show an early indication towards nationalisation options.

Modern rail, from the early twentieth century onwards, was dominated by several significant events before culminating in the privatisation of the industry in 1995/6. The amalgamation of the rail companies into the 'big four' in 1921 set the standard of government intervention following the brief period of nationalisation during the First World War. Nationalised again during the Second World War the railways were over worked and under maintained to the point where significant investment was needed to bring the network up to operational standards (Shaoul, 2004). In the wake of the war the government was not in a financial position to inject large sums of money into private enterprises, and the owners of the industry were unable to finance such large investment. Thus to prevent the railways from falling into disrepair the 1947 Railway Act created the British Transport Commission (BTC), and the railways were brought under the umbrella of nationalised industries.

The aim of the government in regard to nationalisation was always to 'produce an entity that could combine public service operations with commercial viability', although this appeared as time went on to be an impossible task (Gourvish, 2002a). The BTC was abolished in 1962 and the British Railways Board (BRB) set up in 1963 to deal specifically with the railways with a view to improving operational service. The Beeching Report, in 1962, had a dramatic effect on the rail network as it suggested mass closure of many branch lines in order to cut the deficit and bring the industry into the twentieth century. The Government carried out many of the recommendations it suggested, reducing the infrastructure by almost a third (Figure 2-1). The impact was not as successful as originally hoped; neither service quality or value for money improved; and many of the lines that were lost would, today, be strategic links (Wolmar, 2005).

**Figure 2-1 Before and After the Beeching Recommendations were Instigated**




Source: (Price, 1999)

In 1968 the Transport Act provided a public service obligation to distinguish between commercial and social railways and ensured grants were made payable for those lines that remained necessary for social reasons but un-commercial in economic terms. By 1974, after the restructuring and reshaping of the industry, the passengers were being better valued (Harris and Godward, 1997). The railways were now characterised by five main groups (not including Users):

1. the passenger and freight companies now served by lobby groups in response to the powerful road lobbyists;
2. the essentially hard working and dedicated rail managers and engineers;
3. the heavily unionised but low paid general railway workers;
4. the Department for Transport;
5. and the investor, namely the Treasury (Gourvish, 2002a)

These were difficult times for the railway industry, and even though the railways have always endeared a sense of nostalgic affection this has rarely been coupled with respect. British Rail has historically been held in low esteem, been the keen butt of many jokes, and dismissed as an inferior method of transport to road, whether deserved or not. As road building and car ownership increased, rail patronage decreased with even the former transport minister, Dr John Gilbert, admitting to preferring the car to the train. Yet unlike many other industries, the railways have always generated passionate debate from every sector and as Richard Marsh commented in his communications lecture in 1974:

*'Together with labour relations and singing in the bath, knowledge of how the railways should be run is provided by the Almighty at the moment of birth. It is a well-known fact that the nation is divided between 27 million railway experts and 190,000 of us who earn our living on the railways'* (Marsh 1974 cited in Gourvish 2002a p8).

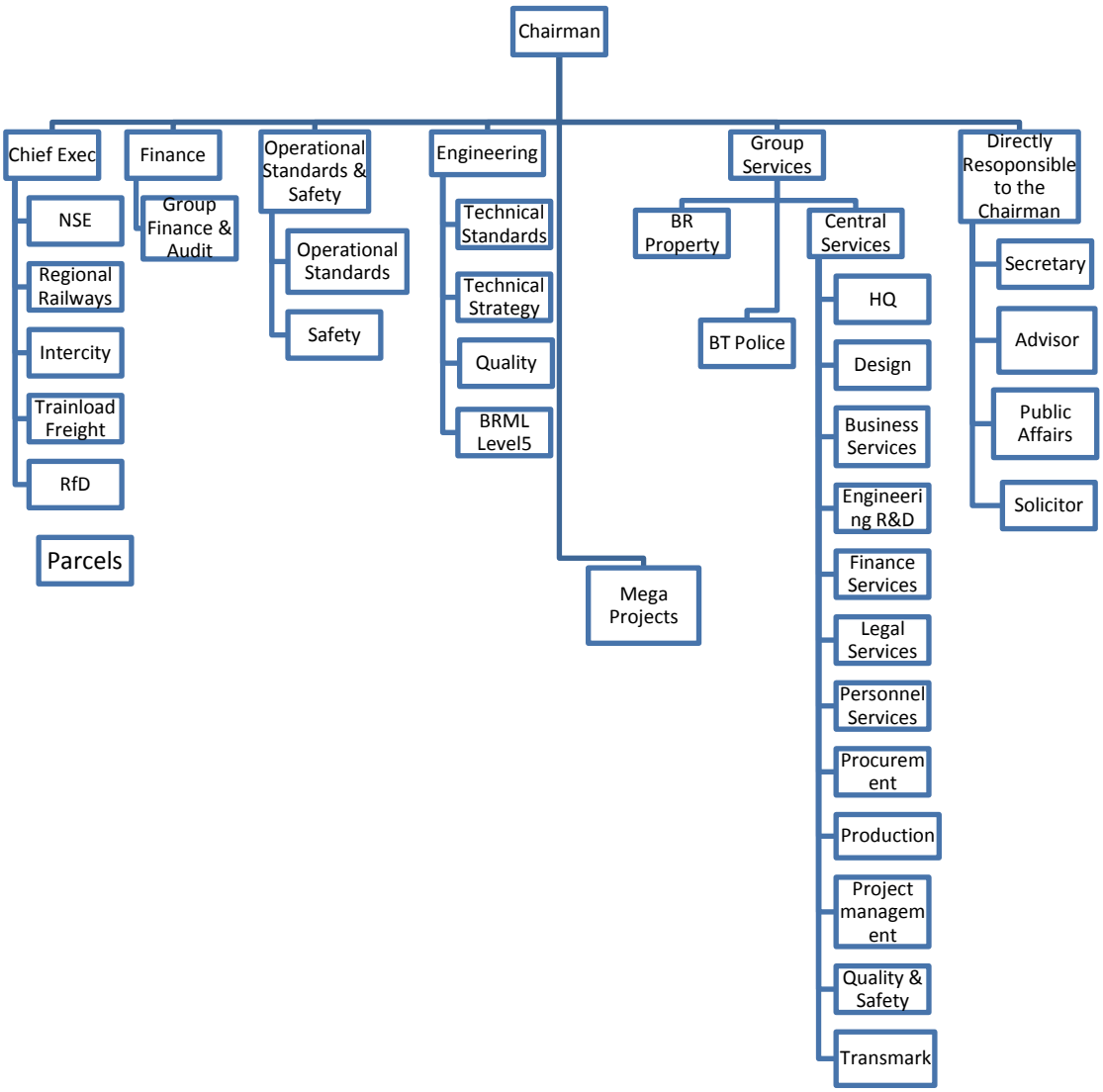
Britain's railways were always mooted as a potential candidate for privatisation in the early Thatcher Government, and it is argued that privatisation was inevitable, it was just the when and how that needed to be decided (Godward, 1998). The complexity of the industry meant that although privatisation was considered on what appears to be a regular basis, it was always shelved as something to consider during the next term of office. As early as 1981 the British Railway Board looked enthusiastically into how to integrate private partnership into the railways. This was a particularly bleak time in rail finances and also the start of industrial unrest. Most of the proposals were aimed at specific projects; such as electrification in conjunction with private companies such as Balfour Beatty; but floundered when the Government insisted that any projects should be 'self-standing' and not 'overtly controlled' (Gourvish, 2002a).

In 1982 the Secretary of State for Transport David Howell, appointed a four-man committee, headed by Sir David Serpell, to analyse the financial situation of the railways and their associated companies with the aim of producing a 20 year plan with the objective of securing efficiency and financial growth in the rail industry. The report engendered a hostile reaction due to the suggestion that the railways should be further reduced in track length and disagreements amongst the committee members themselves meant that practical discussion on the actual contents of the report were overshadowed by public interest in the conduct of the committee (Committee, 1983). One of the findings of the Serpell Committee regarding private investment was taken on board though, and as it concluded that private investment was currently unmanageable, the proposals by the BRB were shelved.

Although the railway objectives set in 1983 by Ridley and 1986 by John Moore made no account for private investment, the option was not ruled out completely and opened the way for procurement, contracting, and other sales elements. The 1985 Omega report from the Adam Smith Institute challenged the concept that the railways needed political control and government subsidy, and with Kenneth Irvine's *The Right Lines* in 1987 and *Track to the Future* in 1988 (Irvine, 1987, Irvine, 1988) further underpinning the arguments for segregation in the operating and infrastructure areas, the privatisation debate could hardly be considered buried. In September 1988 the Board debated the future organisational development of the industry and in the uncertain climate for the long term future of the railways it was decided to radically decentralise the industry regardless of who ended up running it. After careful consideration, in June 1989 the options were taken even further and focused on profit centres and inter sector trading. The decision was made, and government support sought, for what was to become the radical initiative that became known as 'Organising for Quality' (OfQ) (Gourvish, 2002a).

With privatisation supposedly shelved in 1990 it seemed that the OfQ programme of changes could be embraced with enthusiasm, but less than a year later the privatisation debate was rekindled. The idea of franchising and competition was once again looked at by a variety of consultants and although the OfQ initiative was by now well under way, the Government were looking seriously at various proposals for the ultimate privatisation of the Railways. In the meantime, OfQ was instigated and, British Rail began to look like a streamlined commercial enterprise. Figure 2-2 shows the organisational structure that was operational post OfQ in 1992.

**Figure 2-2 British Rail's post OfQ organisation, April 1992**




Source (Gourvish 2002a p 381)

OfQ was the end of the matrix management structure and embraced Bob Reid I's vision of a business-led railway (Harris and Godward, 1997). As the organisational chart shows, sectors guided railway policy but had contracts with different operating and contracting units who operated and maintained the railway. All employees were now under one director who had a separate budget and made his own business decisions. The emphasis of OfQ was on customer service and each business unit contained a group of profit centres working closer to the work

face and customer. Passenger functions were split into five units and freight and parcels became separate units. OfQ was not without opposition and this came from both internal and external sources. One of the main complaints internally seemed to be that rather than abolishing the matrix system, OfQ just lowered it to the customer level. Engineering also had doubts about the new management structure and this became one of the last sectors to integrate into the new system (Gourvish, 2002a). Rail safety was paramount to the new structure and responsibility was given to two sections within the main headquarters: Group Technical Standards and Group Operational Standards.

By 1992 the regions had been abolished and replaced with the OfQ management structure. Staffing levels remained fairly static in the beginning but British Rail Headquarters had shrunk in size. The overall cost of implementation was estimated at around £50 - £70 million (Gourvish, 2002a) compared to estimates of the privatisation process at £5 billion (Harris and Godward, 1997). However, the new organisation was unable to prove itself to its fullest extent as the privatisation debate moved from planning to instigation.

Throughout the last two centuries the railways have struggled to turn a profit, and more often than not, have continually been running at a loss and, since 1968, heavily subsidised. Financial responsibility for the railways has very often lain heavily at the door of the government and even though each change to the industry has been received with great expectations these have ultimately resulted in disappointment. Private ownership of the railways was hardly a new idea considering they were privately owned for so much of their existence but the method and speed taken to return them to private ownership was considered radical. In order to begin to understand the complexities of the privatisation process it is important to understand the concepts of privatisation and nationalisation and the social, economic and political reasons why industries are run under such conditions. The following section looks at the two concepts and discusses the variables that seem to need to be in place for either model to be of any success.

## 2.4 Privatisation of British Rail

Privatisation of the rail industry had been considered previously, but due to the size and complexity of the industry the process was always deemed logistically and economically unviable. The OfQ reforms may have enabled privatisation to take place, even though it was designed to alleviate the need. Private sector involvement was seen by the government as a necessary move in order to inject sufficient investment into the network to continue with the

improvements that had already been made (Harris and Godward, 1997). The three main arguments put forward for privatisation were as follows:

1. Privatised companies were said to be more productively efficient, and even though BR was considered as 'one of the most productive and efficient state-owned railways in the world', the potential for further improvement remained (Harris and Godward 1997 p63).
2. State ownership limited the amount of private investment as a result of being reliant on the funding source, namely the Treasury. Investing in long-term projects which were not necessarily in the interest of the economy in general was problematic, as was the fact that the Treasury was also not in a position to commit to long-term projects; hence the need for private investment from commercial investors.
3. The need for better pricing of goods and services. The government considered private companies to be more effective at pricing due to more accurate evaluation and awareness of costs (Harris and Godward, 1997). However, this also meant that, in order for the railways to be competitively priced, regulation and subsidy would remain a long-term commitment.

The removal of the monopoly held by BR was seen as essential by some, including the Secretary of State for Transport, Malcolm Rifkind, and was one reason that the railways would not be sold outright (Hibbs et al., 2006). Therefore, reform was motivated primarily by the desire to eliminate subsidy, but also by the objectives of using private borrowing to finance investment and of improving the efficiency of the industry. In the year to March 31st 1987, almost one-quarter of BR's turnover (£786m out of £3,830m) came from the government (Vickers and Yarrow, 1989). In its foreword, the 1992 White Paper stated that:

*"the time has come to extend [the benefits of privatisation] to the railways. This calls for a new approach. British Rail makes large losses. It cannot therefore be sold as a complete concern in the same way as other industries we have privatised and there will not be substantial proceeds to the exchequer" (DfT, 1992).*

This suggests that, in the Great British rail sector, the unbundling of the vertically integrated monopoly was driven by the need to make the privatisation process viable.

Privatisation of the railways is not a solely British phenomenon. The British may have carried out the most extensive programme of privatisation in a short space of time, but many other

rail industries across the world have seen some sort of privatisation to varying degrees. It is therefore fair to say that there has been a global trend over the last 30 years of privatising formerly state owned enterprises of which the railways form one sector (Koppenjan and Leijten, 2007). It can also be said that the long term impacts of privatising other rail industries across the world has also seen little research. Short term impacts and concentration on particular operating or economic areas has tended to be the norm and some papers compare these developments to the British privatisation initiative (Boardman et al., 2009). This in itself is a difficult achievement due to the scope of the British scheme having little comparison to any other initiative; something frequently complained about when performance reviews have little to benchmark against (Smith et al., 2009, Preston, 1996, ORR, 2003).

Many of the rail privatisation initiatives across the world have tended to concentrate on small areas of the industry such as commuter lines (Japan) or freight (Canada and the US). Although the US does have many privately owned passenger lines the concentration on long haul freight and the sparse network coverage makes it very difficult to compare with Britain (Nash and Preston, 1994).

### 2.4.1 Franchising Framework

The process of privatisation was complex due to the size and nature of the industry, but also because of the political ramifications. Various methods were debated through 'think-tank' papers and conferences prior to the event, including the following:

1. British Rail PLC – favoured by Bob Reid I.
2. Sector segmentation, which would maintain the benefits of OfQ but limit the possibilities of competition between services.
3. A route-based solution that would promote competition and rely on a pre-1921 structure where BR was vertically separated into a dozen companies and regulation would be reduced, thus enhancing entrepreneurship (Gritten, 1988).
4. A regionally based system such as previously implemented in Japan.
5. An infrastructure authority concept propounded by the Adam Smith Institute, whereby the competition would lie in the operators competing to run services on the network (Irving, 1987).

Although a solution that faced significant challenges, the idea of an infrastructure authority was further developed using the auction of 'slots or train paths' (Starkie, 1984). Although the

method preferred by BR was a complete sell-off in one whole piece, it appeared that this was not viable due to its size and the need for competition within the industry.

Franchising on an infrastructure authority-based model (based on the fifth option above) became the preferred method (Butler, 1985). The idea of franchising is a simple one: property rights that convey an element of market power; market power necessitates regulation; and franchising allows competition for monopoly. With franchising as a method of privatisation, the franchising authority can fix the prices charged and the nature of the services offered. The competitive bidding process then allocates the franchises to firms that can provide the greatest value for money while meeting the objectives laid down by the franchising authority. However, it is equally plausible to sell franchises at unconstrained prices, thereby realising the monopoly rents to government, or to give the franchises away to companies that offer the greatest level of service at the lowest prices to customers (Helm, 2000). The wide-ranging reform plans set out in the 1992 White Paper were largely implemented by the Railways Act of 1993. It set out the provision for the following.

1. The establishment of a track authority that would own, and be responsible for, the maintenance of the infrastructure (including signalling, stations and depots).
2. The sale of freight and parcels to the private sector.
3. The franchising of passenger services with the private sector bidding to operate them.
4. The establishment of a franchising authority that would negotiate award and monitor the franchises.
5. A regulatory body to oversee the track access, promote competition, prevent monopolies, and promote consumer benefits (Harris and Godward, 1997).

The options considered all looked at the industry from an operational and organisational perspective. It is important to recognise a key feature of the rail sector—replicated perhaps only to the same extent in the airports sector among regulated utilities—that makes competition difficult, which is that rail cannot run more than one train along a track at any given time. The time at which a service is run is as important as the service itself.

The passenger rail industry was split up into 25 train operating companies (TOCs) 3 rolling stock companies (ROSCOs) and an infrastructure company: Railtrack (Preston et al., 2000). Apart from the ‘Island Line’ on the Isle of Wight which was vertically separated and had responsibility for the infrastructure as well as the operations (White, 1998), all other train operating companies were horizontally separated and paid access charges to Railtrack whilst

leasing the rolling stock from the ROSCOs. The franchises were awarded by the Office of Passenger Franchising (OPRAF) who invited bids for subsidy required to run the services. The franchise length was initially set at 7 years with an option to extend dependent on specific investments being implemented. Bids tended to be successful if the subsidy amount was kept low and this has been seen as one of the main reasons that over half the original franchise awards failed within the first few years (Preston, 2000).

In addition to the 25 former BR service franchises the Channel Tunnel operations and infrastructure was divested and the Dockland Light Railway (DLR) was also placed under a form of franchise operation in 1997 (White, 1998). Most of the franchised services covered a mixture of regional and long distance services with the exception of the east and west coast long distance rail services. The roles are briefly highlighted in Table 2-1 whilst Appendix 1 gives the franchise ownership and dates of transfer to the operators.

**Table 2-1 Roles and Responsibilities of the newly formed companies**

| | |
|---|---|
| Railtrack | Infrastructure Owner |
| Train Operators (franchised) | 25 Train Operating Companies (TOCs) |
| Unregulated Passenger Services | Eurostar |
| Open Access Operators | Heathrow express |
| Non Passenger Operations | Freight – 7 Freight Operating Companies |
| Rolling Stock Leasing Companies | 3 Rolling Stock Companies (ROSCOs) |
| Maintenance Contractors | 7 Infrastructure Maintenance Units (IMUs), 6 Track Renewal Units (TRUs) |
| Franchising Director | Office of Passenger Rail Franchising OPRAF |
| Regulator | Office of the Rail Regulator ORR |
| Safety Regulator | HM Railway Inspectorate |
| Local Authorities | Passenger Transport Executives PTEs |
| Other Suppliers | Rolling Stock, Signalling, Design, Cleaning Services etc. |

Source: DfT 1996

The basis of the plan was to provide competitive bidding, which would lessen the Treasury burden; an un-geared Railtrack balance sheet that would provide the finance mechanism; and

the introduction of competitive services over time to focus on costs and customer service, thus improving efficiency. However, due to the Labour threats of re-nationalisation if they won the next election, the risk to franchise bidders increased, and private investors into Railtrack were deterred (Gourvish, 2002a). As a result of this increased risk, the regulator, the Office of the Rail Regulator, after persuasion from the government, moderated competition to ease the burden. Privatisation now became the objective rather than a vehicle for achieving the original objectives. This, coupled with the new Labour Government's attempts to integrate rail into one Transport Policy along with all other modes after 1997, rather than maintaining the 'business model' developed by the Conservatives, led to problems with both the industry structure and operations.

One of the key elements of this new privatised structure was the vertical separation of infrastructure-related tasks from operating tasks (Harris and Godward, 1997). Engineering, such as civil, power and signalling, was transferred to Railtrack. Although responsible for these areas, Railtrack subcontracted them to private companies, thereby potentially saving money. However, concerns emerged about the degree of monitoring of its contractors (Wheat and Smith, 2006), and its successor, Network Rail, has both taken some activities back in-house (maintenance) and comprehensively redesigned contractor performance monitoring (Gibson, 2005). Asset knowledge has also increased manifestly since Network Rail took over the infrastructure business, in part due to the obligation to provide and adhere to and asset management policy.

The remainder of the network was split into franchised passenger operators, of which there were originally 25 train operating companies (TOCs); unregulated operators such as the Eurostar; open access operators such as Heathrow Express; and non-passenger operators (ie, freight). The former BR was therefore restructured into one track authority (Railtrack), 25 passenger TOCs, seven freight train operating units and some 70 ancillary businesses beginning to trade as free-standing units on April 1st 1994 (Preston et al., 1999). Three rolling-stock leasing companies (ROSCOs) were also formed to buy and lease out passenger and freight trains.

The franchised companies operated the specific services but did not have ownership of the tracks, the stations, or the trains themselves. The three ROSCOs supplied the trains on a lease basis, but these trains were built and (in some cases) maintained by yet different companies. The track renewal units and maintenance units of the former BR became companies prior to privatisation and were sold as such. The administration side of the industry was set up as the

Office of Passenger Rail Franchising (OPRAF), responsible for the franchising of the passenger services. The Office of Rail Regulator (ORR) was responsible for issuing the licences to run the services, approving the franchise agreements, and enforcing domestic competition law, and the railway inspectorate (HMRI) continued as before as an independent safety regulator affiliated to the Health and Safety Executive (Preston and Whelan, 1995). This now meant that financial responsibility for the different elements of the industry were split up, and rather than a straightforward budget being allocated, money came from a variety of sources including local authorities in the guise of Passenger Transport Executives (PTEs) (Harris and Godward, 1997).

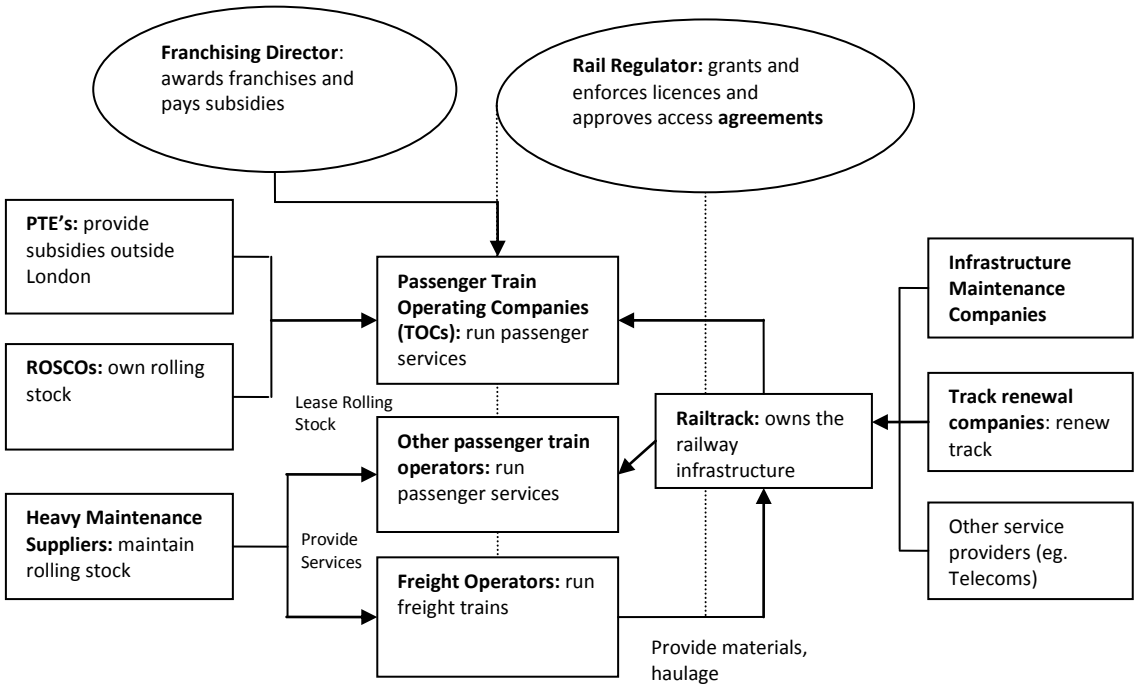
The horizontal separation of BR's passenger rail business into 25 train operating units corresponded broadly to the existing profit centres devised by OfQ. The competitive bidding for franchises was based on an auction for the subsidy required (Dnes, 1992). It was intended that this would bear down on the burden placed on HM Treasury by lessening the amount of subsidy needed to increase the service provision thereby ensuring value for money and increasing quality for a lower percentage of public funds. Most of Railtrack's 2,500 stations were leased to the TOCs, but it retained the management of 14 major stations. TOCs obtained the right to use stations or depots either by leasing facilities from Railtrack, or by means of regulated access agreements with other TOCs which operate them, or, in the case of the 14 major stations, with Railtrack. Meanwhile, TOCs obtained the use of tracks by means of regulated track access agreements, involving submitting Railtrack to the UK's traditional RPI-X regulation, whereby future track access agreements for the next five years are set at five-yearly periodic reviews. Rights of access were made available to private freight operators without a franchise.

The BR freight companies were privatised as follows. Trainload Freight, a specialist carrier of bulk raw materials, was sold to English, Welsh & Scottish Railways (EWS), a subsidiary of Wisconsin Central, in 1995. The domestic container business of Railfreight Distribution (Freightliner) was sold to MCB Ltd as a management buyout in 1996, while its European intermodal and automotive freight business was also sold to EWS. The express parcels service, Red Star, was sold in 1995 as a management buyout. Finally, EWS bought Rail Express Systems Ltd, the carrier of mail for Royal Mail, in 1995.

The intention was that rights of access for new passenger service operators would be established immediately, in order to fulfil the third policy objective of improving the efficiency of the industry (Glaister, 2002). However, because of concerns surrounding the opposition

Labour Party's plans for a re-nationalisation of BR, the government decided that competition should be 'moderated', thus reducing the risk to investing in TOCs. Hence, open access was postponed until 2002[3]. Nonetheless, there has been some significant competition between franchised operators conveying passengers along similar routes, most notably between Virgin West Coast and Chiltern between London and Birmingham; Gatwick Express, Southern, and Thameslink services between London and Gatwick; and GNER and WAGN between London and Peterborough. This competition has generated product differentiation, service frequency increases and selective fares cuts (Preston, 1999a). Figure 2-3 outlines the structure of the industry immediately after privatisation.

**Figure 2-3 The Structure of the British Railway Industry after Privatisation**




Source: (Thompson, 2004)

Although there were significant savings on operating costs in the first few years of privatisation ((Smith and Wheat, 2007, Pollitt and Smith, 2002)) these abruptly came to an end with the Hatfield crash in October 2000. Hatfield became synonymous with the downfall of Railtrack due to the nature of the accident and the resulting infrastructure and

[3] Open access has been instigated in small ways in certain parts of the network, but has not been initiated to the extent of the original plans.

maintenance inefficiencies that it uncovered. Maintenance and renewal were reappraised after the event and significant and sustained increases in funding were instigated. An important question arises from this increase: are post-Hatfield cost and productivity levels reasonable and should they be sustained? An important reason for the privatisation of the rail industry was the reduction in Treasury spending and the encouragement of competition in order to incite cost efficiency and high productivity. The increased costs of the railways have burdened the Treasury to levels unseen in the nationalised era. It has been argued that the need for increased funding is defensible as previous funding was inadequate, but in order to justify this increase it must first be found that a/ the inadequate funding requirements for infrastructure were directly responsible for the Hatfield Crash and b/ that the current levels of funding are comparable to other network infrastructure costs. Both these scenarios are difficult to prove and open to assumption. The main problem with the latter scenario is that until recently there are no other directly comparable infrastructure networks to compare with and therefore no methodology with which to employ. Smith (2008) addresses these issues in his research on costs and benchmarking Network Rail efficiency savings (Smith and Wheat, 2008) and recent benchmarks have been stipulated in the Control Period 4 operational plans for Network Rail.

### 2.4.2 **Rail Under labour**

In 1997 there was a change of emphasis with regards to rail objectives when the first Labour Government for nearly two decades came to power. Labour had pledged to bring Railtrack back under public control. The White Paper of 1998: 'A New Deal for Transport: Better for Everyone', was an integrated transport policy that would also tackle pollution and congestion by encouraging users to switch from cars to buses and trains. The Conservatives had planned an efficient stand-alone network but had not built into the equation any plans to enlarge the network. The Labour ideology would need extra financing to ensure that instead of a decline in services, they were increased to accommodate extra routes and increased capacity.

The Labour idea was to use the Strategic Rail Authority (SRA), supported by the Integrated Transport Commission (ITC) and the Rail Regulator, to steer this forward. The Rail Regulator would, in fact, become subordinate to the SRA, as reflected in the Transport Bill 2000. Unlike much of New Labour's inheritance of the privatised industries from its Conservative predecessors, the railway industry was made subject to radical reforms by the newly elected government. This change of policy, from the Conservatives' drive for efficiency, to a White

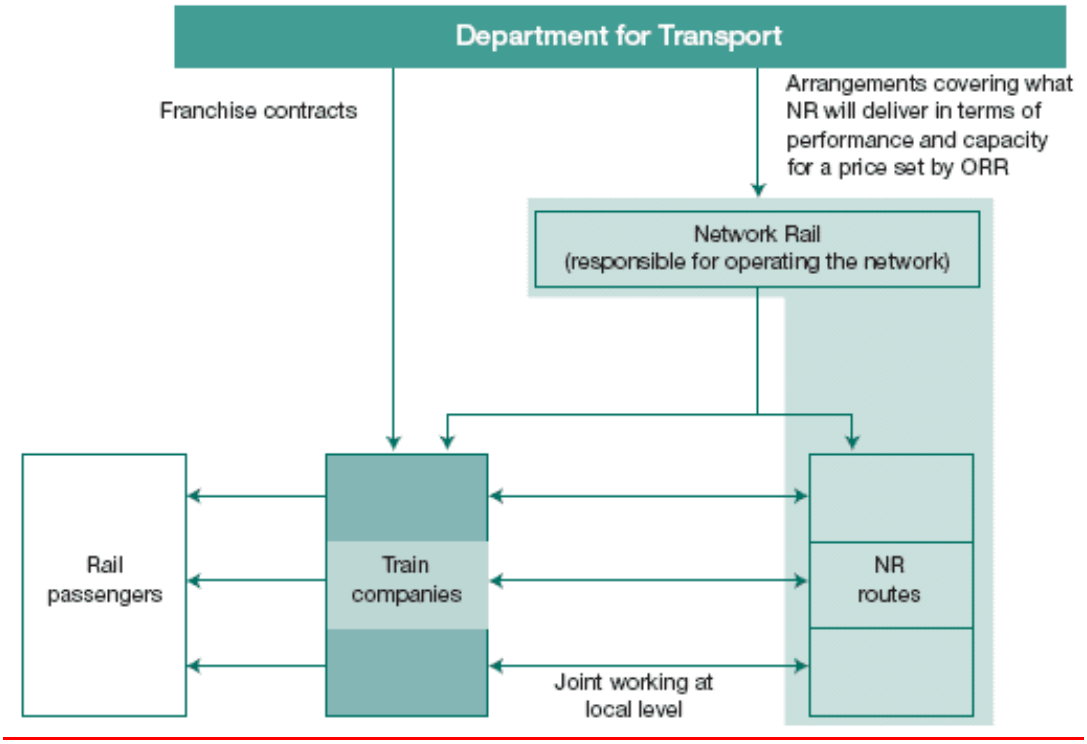
Paper that called for an expansion of the railways, required substantial reforms to the structure of the industry.

According to the 1998 White Paper, the Strategic Rail Authority (SRA) would take the objectives of policy and translate them into a *'clear, coherent and strategic programme for the development of our railways'* (DfT, 1998). Crucially, the White Paper did not specify the sources of funding for the SRA's activities. Therefore, when the shadow SRA[4] attempted to implement the slogan of its first chairman, Sir Alastair Morton, 'investment, investment, investment', it had to consider its options carefully. It quickly became clear that Railtrack's balance sheet did not provide the solution, and with the Hatfield Crash highlighting the many inefficiencies of the infrastructure, Railtrack saw no option other than embarking on a far reaching and costly maintenance programme that left the SRA severely constrained in its spending review (Gourvish 2008).

The resulting lack of confidence in Railtrack, and resulting fall in share price, led to the failure of Railtrack and the beginning of the end for the SRA (Gourvish 2008). The new structure for the railways was developed with efficiency in mind. The structure became simpler and the Government – through the Office of the Rail Regulator (ORR) – increased their control. The organisational structure of the new railway is shown in Figure 2-4.

[4] The Shadow SRA was set up to 'shadow' for a year before becoming the railway authority – this is fairly common practice when regime change is implemented and can be seen as a practice run to iron out potential problems.

**Figure 2-4 Post Hatfield Organisational Chart**




Source: (Preston, 2002)

Network Rail became the infrastructure authority and was a company limited by guarantee. Although the SRA worked on the development of Network Rail it was rapidly seen by the DfT as an unnecessary complication in the management process and by 2005 the SRA was dispensed with (Gourvish 2008). Under the new arrangements, the Government would set the level of public expenditure, and take the strategic decisions on what this should buy. New regulatory and contractual arrangements would be put in place between Network Rail and the Government, to run alongside, and provide the context for, the franchise contracts with train companies. Network Rail has been given clear responsibility for operating the network and for its performance and accountability and control is more clearly given to the different sectors with a move towards integrated working and shared interests planned. This arguably gives back control of the purse strings firmly to the Government and in economic terms questions the ability of the franchisees and Network Rail to provide a commercial and competitive industry. In the meantime; environmental concerns, congestion, and a deepening fuel crisis have switched priorities towards favouring rail, and yet very little investment on increasing the infrastructure had been made.

The structure set up first by the Conservative and then Labour Governments was fraught with problems. The fragmented structure of two regulators and the separation of infrastructure owner, train operating companies, rolling stock providers, and infrastructure maintenance and renewal companies forced many new entrants into the industry into steep learning curves (Gourvish 2008). The bidding process and franchise agreements were expensive to carry out and rigid in their design (Alexandersson et al., 2008). Over optimism regarding cost savings and streamlining meant profits in the interim were negligible and service suffered as TOC's cut staffing to meet targets; over half the original franchises failed (Gourvish 2008). In many respects, mistakes were made that had far reaching consequences that were not considered at the time.

One of these mistakes was possibly the management of the failure of the MTL franchise in Liverpool. The MTL was the first franchise to fail and also occurred at the start of the new Labour Government in 1997 when policies were still being defined and knowledge of what to do in the event of a franchise failure had not been tried or tested. OPRAF approved a management agreement and bailout before refranchising which opened up the way for other franchises to see that failure was not the major financial risk that was first thought. Soon after this franchise failure other franchises appealed for either renegotiation or management buyouts costing the Government a considerable sum. Eventually the Operator of Last Resort was used even though this ability had always been in place and failing franchises could have been left to 'go to the wall' possibly securing both a reduction in taxpayer costs and a better commitment to the franchise contracts from the operators and even a reduction in the failure rate of the initial franchises (Whelan, 2008).

Regulation needs to be stringent but should not encourage adverse actions. Instances during the last few years have seen a variety of negative impacts from regulation designed to improve the service. Regulation regarding punctuality saw operators cancelling trains rather than be penalised for lateness. Regulation encouraging operators to claw back money from other operators (or Network Rail) if their service was delayed through the fault of another saw some operators collecting more from fines than from passenger receipts ((Preston, 2008b).

Since the more recent – post-Hatfield – restructuring of the industry there have been significant improvements, although there are still areas where regulation and competition are not compatible.

Preston (2008) argues for five main areas that should be followed for successful franchising:

1. Service requirements should be easy to define and reasonably stable.
2. the technology should be well understood.
3. sunk costs should not be too high.
4. the initial costs of defining and letting the contract should be low.
5. monitoring of service delivery and quality should be feasible.

Arguably these features only partially apply to the passenger railway industry and as a result franchising has had mixed results. Risks and uncertainties have distorted the process, and coupled with so few incumbents' winning repeat bids for their franchises, investment into the industry is understandably cautious. Ensuring that investment follows increases in franchise length, to encourage investment, has proven to be a difficult problem to solve.

#### *2.4.2.1 Where Are We Now?*

Vertical separation has had some advantages in promoting specialisation, a better understanding of infrastructure costs and encouraging competition. However, there are also significant challenges in providing the appropriate incentives for investment, given the naturally monopolistic characteristic of the rail network, and the scale of investment that has been and continues to be required.

Preston (2008) finds that rail franchising in Britain has been competitive and has permitted reductions in revenue support to something approaching the pre-privatisation levels. There have been risks and uncertainties, though, and that has been found to have distorted the process, resulting in relatively little transfer of risk from Government to the private sector and therefore limited innovation. Rail reform has been a costly and on-going exercise that has yet to be completed. Transparency of objectives is paramount to the success of any privatisation programme and this was lacking from the original scheme. The current structure has improved the situation, but competition has not developed to the extent that was envisaged in the original infrastructure and franchising model.

Competition within the industry does raise questions for the quality and value of service to the consumer. Individual franchises are now competing for customers and deriving their own unique brands with differing weight put on particular service requirements. This begs the question of the effectiveness of horizontal competition; should franchises compete so ruthlessly with each other or should the emphasis be on competing with other transport modes through a pooling of resources and collaborative support? One of the examples of this is through the fare distribution software process – Operational Research Computerised

Allocation of Tickets to Services (ORCATS). The revenue received through the ticket sales are distributed to each franchise along the route the ticket covers and weight is given to the presiding franchise. Many operators are now producing specific tickets to named stations to avoid part of the allocated revenue being taken by other operators. These tickets tend to be cheaper but stipulate the train service that can be used and the time the journey can be taken. The Operator then gets the full amount of the revenue received and builds loyalty with the customer through reduced ticket prices. Allocation is also given on the nature of the service provided; therefore a fast train will get a higher percentage of revenue than a competing slower train. Concentration is then given to the receipt of increased revenue allocation rather than on the suitability of service to passengers.

One of the key aims of the separation of the rail sector was to facilitate investment in the infrastructure and the rolling stock. Under public ownership, the financial constraints led to under-funding of long-term investment. The model initially adopted, with a single privatised operator managing the network while sub-contracting a significant proportion of the maintenance work, enabled significant investment to be channelled into the system, but at the expense of quality controls over the work undertaken. The transfer of the responsibilities of Railtrack to Network Rail, and the change in working practices that that involved, appears to have addressed these concerns.

## 2.5 Conclusion

Both property rights theory and principal agent problems are clearly apparent in the shaping of the privatised rail industry. Increases in regulatory control and a shift from an initial totally privately owned and managed rail network to an industry that has the firm control by the Department of Transport highlights the continual balancing process of ownership, responsibility and control whilst achieving quality and value of service. It appears that there may have been a desire to absolve the rights and responsibility of Government in return for competition and efficiency but when the service and value seem threatened the Government is keen to gain control back – if not ownership.

Privatisation has appeared to have brought stability to the industry that nationalisation could not. The Treasury has less control and finances are fixed into longer contractual agreements. There are also other streams of funding and infrastructure investment available that was lacking under the old regime. It could arguably be said, although the statistics appear to back this up, that the transition period of the railways did not really end until after 2005 when the

passenger kilometres and revenue started to increase. Post privatisation and prior to 2005 there was still much restructuring and crisis management borne from the instigation of such a large restructuring event where no previous similar events could be used to learn from. Many mistakes were made, and many outside influences interfered with the process.

The advantage of hindsight will always allow a clearer view of what should or could have happened and both the Conservative and Labour Governments made many decisions that had adverse impacts that were previously unforeseen. Short franchises, increasing operator support and many bail outs of franchisees were possibly some of the issues that hindered the transition period. The railways do appear to have settled down in recent years and the leadership and control of the different factions is stringent through the regulation and transparency that has now evolved.

The literature that has been reviewed and the historical accounts of the rail industry in Great Britain that have been described in this chapter help us to understand the complexity of the political and economic events that have helped shape the railways into what they are today. The structure of the railways over the 30 year period can be seen as continually evolving and complex. Achieving the balance between operational standards and costs has been a difficult journey that has, arguably, yet to end. Tightening of regulation, increased government control, and stringent franchise agreements have highlighted a potential principal agent problem. This is further highlighted through the increased costs and subsidies that have also occurred. It is interesting to note that contrary to their continual promise of renationalisation whilst in opposition, once in power, the Labour Government quickly dropped the policy in favour of an integrated and regulated industry. This may underpin the theory of property rights and also allows the Labour Government a certain amount of distance from the blame if, as happened in October 2000 and the Hatfield Crash, grave errors in organisational structure are laid bare.

Understanding how much the change within the industry has cost the various stakeholders and whether the privatisation initiative was of any benefit to them is the subject of this research. How this will be achieved is described in the next chapter. There have been many approaches to analysing costs and benefits and in order to fully understand the cost regime and reasons for the increases it is necessary to look at the research that has taken place over the last 10 years into the various aspects of the railways. The following chapter will look at the research that has taken place and the methods employed before outlining the methodology chosen for this research.

# 3 Methodological Approach to Costs and Benefits

## 3.1 Introduction

When deciding on a suitable methodology for a research topic it is important to account for a number of determining factors such as: what has been used before, what has previously been effective, what data is available to be used and what methods can be utilised to accommodate the data. It is worth noting here that the actual process of design and development of the model and method used in this research was a work in progress rather than a methodology developed prior to the event. Due to the limitations of availability of research on such a broad subject area, as this research proposed, a variety of methodologies were considered taking in political, industry and academic recommendations.

The first section of this chapter will consider the journey that was taken in determining the methodology. A discussion on the barriers to certain methodologies, the limitations of the research and the background to the project itself will be considered and an outline of the reasons for choosing the methodology implemented – Cost Benefit Analysis. Although this research is concerned with ex-post Cost Benefit Analysis it is worth considering the research that has been carried out on CBAs as a whole and the strengths and weaknesses that have been found in the methodology and this will be covered in the second section. Assessing the costs and benefits of the rail industry is fraught with difficulties such as problems with cost modelling, changes in accounting procedure, fluctuating cost of resources, and inaccuracies in demand forecasting. Many attempts have been made to assess costs of various features of the industry including infrastructure, safety, and subsidies, as well as an assessment of the actual cost benefit process itself.

This chapter will, therefore, look at the research that has been carried out in order to support the methodologies chosen in this thesis. The first section considers the research journey, the second section looks at cost benefit methodology and then application in relation to large infrastructure projects and the railways is considered. The final section will look at the CBA methodologies in relation to this research and explain the general methodology that will be employed.

## 3.2 Developing a Methodology

The aim of this research is to understand the impacts of the privatisation policy on the railways and to determine how much of the growth that has occurred in Passenger Kilometres is due to that policy initiative and where the costs and benefits of the policy have been felt. In order to carry out such a task there are a number of activities that need to take place. This section highlights the journey through determining the methodology for carrying out the research and links the previous and future chapters into a comprehensive story of 30 years in British Rail policy history.

When attempting to ascertain the impacts of policy on a particular industry it is useful to have something to compare to. This could either be a like – for – like process such as that carried out by Boardman in 2009 when he compared the newly privatised rail sector against a continually nationalised one in Canada (Boardman et al., 2009), or a separate space in time such as the work by Smith in 2006 on the costs prior to privatisation compared to those post privatisation (Smith, 2006). It may also be practicable to compare against an industry in another country or a different industry sector that has worked through a similar process, but, to carry out such a study requires that there is something – be it an industry, country or methodology – that is comparable, and as found by both Preston and Smith this has proven difficult (Smith and Wheat, 2008, Preston, 2008b).

One of the main issues with studying such a large industry sector over such a long period of time is the reduction of available comparisons. It will be found throughout the rest of this chapter that although a great deal of searching took place the ability to compare the whole of the study was impossible – and to compare small aspects illogical. It became apparent that the methodology for this research could be informed by prior studies, could take account for the different methodological processes, and could both draw from and develop the work of others, but would need to test and develop the main body of work from scratch. Another issue to contend with was the fact that during the data collection and review of literature and methodological choices there was a lot of work occurring around the concept of rail demand. The Passenger Demand Forecasting Handbook – the parameters by which demand is calculated for the purposes of testing the viability of infrastructure and service changes – was in the process of being reworked due to issues with both under and over estimation in many tests[5]. This, and other projects such as Whelan et al. (2010), have only come to publication

[5] Work is being carried out by Oxera and other consultants for the DfT as of 2009

since the majority of this thesis was designed and written therefore the work cannot be included as work that has been further developed but, where able, it has been referred to for comparison and to provide a clearer insight.

To achieve the research aims the research journey had to start from the very beginning of the time period and develop the data, history and methodology over time. It has been shown in the literature review how diverse the subject matter is and the complexity of the various impacts from politics and economics and how the history of the rail industry impacted on the future development. Encapsulating these impacts into a workable methodology required a greater understanding of the data available, the history and behaviour of the industry, and the complexities of the political will and economic framework that was apparent. The literature review has provided much of this evidence and in generating the background to the research specific variables of interest were noted for inclusion into the model of impacts on demand. The data collection of these variables proved difficult and therefore required a reworking of the initial framework which meant the research quickly fell into a pattern of adjustment and reconsideration as different elements were removed, replaced or reformulated.

The following chapter will highlight the journey through the data collection and will highlight the difficulties involved in collecting specific time dependant data from a variety of sources. Problems that were encountered included - data that suddenly stopped being collected, methodology of the collection process changed, and organisational changes altered the allocation of data, and the detail and aggregation of data changed. There is a slew of data available for rail but not all of it could be utilised and not only rail data has impacted on demand therefore the data trends chapter also looks at other factors external to the rail industry that may be of relevance.

Although there was a desire to include external factors such as fuel costs, modal change and environmental impacts the data for these variables was difficult to align to the rail data. The environmental impacts are especially difficult to interpret and this is explained in greater depth in chapter 4, section 4. The literature review has highlighted several events within the research time frame that had adversely affected demand – Hatfield, strikes, recession and fuel costs. Although some of these events may have increased demand others would have reduced demand and during the 30 year period studied there has been an increased awareness of ‘being green’ that may have resulted in a switch to the more environmentally friendly mode of transport - rail. That said, the added environmental impacts of renewal and maintenance has been significant and these ‘costs’ are long term and attributed to the life span of the

infrastructure. Accounting for all these factors across such a large network proved unwieldy and initial tentative calculations gave minimal credit to any costs or benefits. Due to the difficulties in determining the many factors that had impacted on rail demand let alone those with a minimal impact it was decided to leave the environmental factors out of the model and use the discussion around the topic as evidence of accountability.

Other external variables – such as car and bus – are discussed in chapter 4 and their impact on rail demand is explored. National Transport Trends has shown some interesting developments within the area of car use over the last 30 years and although there is strong evidence to suggest that there has been a significant modal switch between car and train it became problematic to suggest that the increase in rail demand was from modal switch rather than new journeys. It was again decided not to include this factor in the demand model as accounting for adjustments over such a large network and a long time period would be too difficult to justify. That said, the different external factors that are described in chapter 4 are important indicators of the change in behaviour of consumers and also underpin the argument for the impacts of political and economic events and policies on transport use over the 30 year time period.

Once a comparable set of data had been collected a methodology for ascertaining the impacts on demand was considered. Pawson (2002) suggested that one of the reasons that testing a policy impact had yet to be carried out could be because the effects of a policy change are distorted by exogenous variables such as changes in population and income and are overtaken by other policy initiatives (Pawson, 2002). Undeterred, a methodology was developed that would account for the different data types, help to ascertain the start of the policy impacts and to disaggregate the costs and benefits to the different stakeholders. The following sections in this chapter consider the accepted methodologies for addressing the problem and explain the reasons why a cost benefit analysis was chosen.

Before a cost benefit analysis can be carried out there needs to be comparable sets of data to compare. This consists of the development of a simple econometric model of rail demand and extrapolative models of key variables such as fares, train kilometres and costs. The demand forecasting model was developed and informed by the work of others such as Wardman (2006) and influenced by the research on transport trends and social and economic impacts as shown in chapter 4. As it has been said before, this research is not a study of econometrics but uses econometrics as a means to understand the impacts of a policy change whilst accounting for the external factors such as politics, economics and social behaviour. For this

reason it was not a feature of this research to develop new ways of testing impacts or to design new econometric methodologies. The model designed was simple yet unique, but the methodology behind the design was common place. The chosen methodology was a simple semi-logarithmic regression model chosen for its simplicity and transparency and because it is the most widely used methodology in transport economics (Picard et al., 2010, Wardman, 2006, Wheat and Smith, 2008). The aim was to generate a test statistic; Coefficient B for PKm; that could then be used to predict the impact of privatisation.

The modelling itself may not have set out to be a significant aspect but it became a central feature of the research as it quickly became apparent that the initial data availability and its ability to interpret and account for the external events – such as Hatfield, recessions, strikes, and fuel crisis and policy evolvement – would not easily be accommodated. One of the main features that required consideration was that of the actual start date of the impact of privatisation. 1992 was the publication date of the White Paper and therefore knowledge of the process to be carried out. 1993 saw the Railway Act granted and confirmation of definite timescales to privatisation published. Privatisation impacts could have started to occur around this time in both positive and negative ways from an organisation, political and consumer perspective and this has been explored in the literature review. 1995 was the actual start of the process (although some sectors and affiliated companies had been sold off prior to this), but 1996/97 was the time that the process had finished and the beginning of a fully privatised industry. Various authors have given differing dates for the start of the privatisation impact and these have been discussed and compared to the choices made in this research.

Over 100 different model specifications were tested, in particular with respect to functional form (linear and log linear models were also tested), the specification of the dependent variables (e.g. the reciprocal of TKM was tested), the use of lagged variables, alternative explanatory variables (e.g. car ownership, petrol prices) and alternative specifications of the Dummy Variables. The final choice of model was determined by its ability to predict changes in demand (98%) and its simplicity and ease of use for the research over the time period studied.

The aim of the model was to account for a counterfactual scenario; a ‘do nothing’ comparison when compared with an alternative action. The counterfactual can be calculated using moving averages up to the point of privatisation but this will only allow for a comparison of what has happened with what would have happened. What it does not account for is how much of what has happened is due to privatisation rather than any other reason – a ‘would have

occurred anyway' scenario. This is one aspect of the research that differs from other attempts at long time series modelling such as Whelan et al. (2010) and Camilleri (2004). Research of modelling may look at the different impacts of the economy, cost structures and social and political changes but this research aims to attribute the change to a specific element. Whelan et al. study the economic impacts on the railways and include the same dummy variables that were independently developed here, but the research does not set out to isolate the privatisation impact and therefore does not include this within the model. The model was devised so it could interpret the actual data as well as the counterfactual data. This meant that three data sets were effectively generated – what happened, what could have happened, and what should have happened. The impact of privatisation is then clearly represented outside of the actual changes that have taken place.

During the development of the counterfactual it became important to relate the actual events over the time period to what the data was actually saying. The literature review has provided a comprehensive account of Thatcherism and the privatisation policy, and the rail history accounts for many of the events but applying them to what may have occurred in a counterfactual scenario is considered at the point of the counterfactual development. This enabled the counterfactual to become robust and relevant to actual scenarios that have occurred – and would have occurred – had the privatisation policy not been initiated. Once the model had defined the counterfactual scenario the first steps towards understanding the policy impacts through cost benefit could be carried out. This came in the form of consumer surplus – an economic measure of consumer satisfaction, which is calculated by analyzing the difference between what consumers are willing to pay for a good or service relative to its market price – and the change in revenue – the cost or benefit felt by the operators for providing the service. It is assumed that there will be a substantial consumer surplus due to the large increase in demand but the regulation of the industry suggests profits will be limited.

The model was only used for the demand side of the data and not the costs, there is no comparable scenario for costs other than a counterfactual. The costs presented their own set of difficulties regarding availability, disaggregation and consistency. Each set of accounts for the period of British Railways (1979-1995) emphasised specific elements of data rather than presenting the individual data as a whole throughout the time period. In some years data was broken down into specific operating costs and in others the data was kept aggregated. This provided a significant problem with comparison to post privatisation data where the costs are available for the train operating and rail maintenance separately. A considerable amount of

time was initially spent on trying to decide which costs could be attributed to which stakeholder and where the data was not disaggregated by which percentage the attribution should be. Whilst this was taking place the events and policy implications of the era were also being considered alongside each accounting year. Various research papers were consulted, where costs were a main feature and data had been identified and manipulated, but the understanding of how the disaggregation had been achieved and why certain calculations had been made proved difficult to compare to the objectives of this thesis. The main research undertaken for costs of the rail both pre and post privatisation is that of Smith (2006). It was decided to incorporate this work into the research and develop Smith's model further. The cost calculations found in Chapter 6 are based on the work of Smith (1996/7 to 2006/7) (Smith, 2006, Smith and Wheat, 2007), with the series extended using company accounts and the TAS Rail Industry Monitor.

Operating and capital costs are only one aspect of the cost implications and thought needed to be given to any income from sales or costs incurred due to implementation of the policy change. Transition costs are those costs incurred as a direct result of a policy change and would not have occurred under a counterfactual scenario. Transition costs include consultancy, legal and financial information gathering and activities as well as direct contractual and processing costs. Transitional costs can be offset by the actual sale of companies and this may have been an intention of the privatisation process (Dnes, 1993). Transition costs differ from transaction costs in the sense that transaction costs are ongoing rather than a one-off cost. When it came to looking at transaction costs there appeared to be little work carried out on the impact over time and a great differing opinion on how these costs are appropriated and disaggregated. Until recently the majority of studies had looked at transaction costs as applicable to specific events and policy changes i.e. Hatfield and the most comprehensive data available concerned itself with initial transition costs. It was decided to allow the ongoing transaction costs to remain within total costs and to use the start-up costs as a one-off cost disaggregated between stakeholders as informed by previous work (Nash and Smith, 2007, Preston, 2002).

Once this journey had been completed there would be three specific sums of money that could be attributed to the stakeholders of the rail industry. These figures would be either costs, a reduction in income or benefit to the stakeholder from the privatisation initiative, or a benefit, and increase in the income or benefit to the stakeholder from the privatisation initiative. The next step in determining the costs and benefits that have occurred is to

calculate the welfare benefit – this is the change in the revenue received due to the policy change minus the amount of cost of the policy change added to the change in the consumer surplus. This methodology allows the research to compare the costs and benefits of the policy change to the different stakeholders – Government, Operators, Users and Non-users and to determine whether the privatisation policy initiative has produced an overall cost or benefit.

The research journey finally ends once the analysis of where the costs and benefits have been felt is attributed to the changing political and economic era of the research time frame. This analysis will endeavour to produce tentative recommendations for policy in the future and will, no doubt, recommend additional research to underpin the findings. To continue on the research journey the following sections will take into account cost benefit methodologies and the difficulties in forecasting over a long time series.

## 3.3 Cost Benefit Methodology

Cost benefit analysis is used to help forecast the impacts of specific investment and to identify the value of carrying out one proposal compared to another. CBA is also used to monitor the impact of regulation on an initiative i.e. privatisation. According to McVea (McVea, 2005) CBA:

*"is a practical and rigorous means of identifying, targeting and checking the impacts of regulatory measures on the underlying causes of the ills with which regulators need to deal, those causes being the market failures that in turn may justify regulatory intervention"*
(McVea 2005 cited in Vleugel & Bos 2008).

Cost benefit can, therefore, decide whether regulation of an industry needs to be strengthened or, if the regulation is hindering or preventing competitive activities, it may need to be re-evaluated. CBA is carried out either ex-ante or ex-post, depending on whether the project or industry is being evaluated on previous performance or value is being forecast, and in some cases a CBA is carried out on completion of a project to gauge whether the original assumptions have been met.

One of the problems with CBA that were identified by Vleugel was the difference between the CBA outcomes when an ex-ante CBA is compared to an ex-post CBA once the project is evaluated (Vleugel and Bos, 2008). They restrict their research to purely infrastructure projects of which railways are a main feature. The problems with the divergence of results means CBAs are increasingly questioned for validity and robustness. One of the main issues that seem to reoccur in the analysis is the difficulties in assessing environmental impacts. This

is not an uncommon complaint, many of the papers that have been reviewed look towards environmental impacts as being a cause, if not the main cause, of inaccurate CBA forecasts (Schade and Rothengatter, 2003).

One approach by Feng and Wang that tries to deal with this issue is by combining cost evaluation methods in order to derive a more substantial methodology (Feng and Wang, 2005). By combining the contingent valuation method (CVM), that estimates economic values for environmental services, with a fully economic evaluation approach they are able to construct a new transport evaluation model that highlights the importance of including environmental costs in order to ascertain the benefits and identify specific stakeholder conflict. This is always assuming that the environmental costs are an important aspect of the transport infrastructure to be negotiated. Feng believes that using the integrated model allows interest groups to pursue bargaining tactics with other stakeholders by providing the evidence – or disputing the beliefs – of environmental cost allocation. As it appears that the environmental factors are one of the main weaknesses in CBAs this methodology devised by Feng & Wang (2005) may help to strengthen the relevance of the results and reduce the amount of over-spend on many projects, but it does not necessarily answer the problems identified by Vleugel.

Kidokoro (2004) looked at practical methods of estimating benefits to infrastructure projects on congestion-prone transport networks and compared the results of three methods (Kidokoro, 2004). Using a benefit estimation methodology for first-best case and comparing to a second-best case scenario - where costs and benefits vary on routes – it is found that the differences between the final calculations of benefit differ to a considerable degree. One of the problems here is the inclusion or exclusion of certain costs. If costs can be clearly identified the results appear to improve but if costs such as environmental costs have to be assumed then the models tend to adjust accordingly and the results are less robust. This is particularly pertinent to this research where the benefits of the whole network are calculated rather than a specific route. If estimations of benefit on a small route can differ depending on the model and method chosen then the calculations for a large scale project will be even more pronounced. The impact of the problem of CBAs giving possibly unfavourable projections causing projects to be delayed, or even cancelled, has been analysed using the Dutch experience (Annema et al., 2007).

Another issue for CBA methodology lies in standardised methodologies across sectors and ensuring variables are weighted in the same way. Preston and Mackie (1998) found that:

*"roads are not appraised solely on the basis of their traffic, economic and environmental performance as expressed in the Framework, but also on Government Office judgement and their importance to the overall network" (*Preston 1998 p1).

The paper looks at 21 errors and bias in transport appraisal (Mackie and Preston, 1998) and found that there were errors and inconsistencies' across objectives, methods and sectors and that double counting, inappropriate values, and failure to balance quantified and non-quantified items can all affect the evaluation (Mizutani, 2011). CBA of roads, specifically trunk roads, has been found to lack the information required by the different stakeholders for a robust evaluation to take place (Rosa, 2010). The lack of information coupled with inefficiencies in dissemination could mean that the methodology used to conduct the CBA is ineffective. Increasing robustness of both method and awareness would come at a cost, but, Oxera found the extra cost – approximately £600,000 a year – could be reduced through tailoring CBAs to the needs of the individual project being evaluated (Rosa, 2010).

The quality of ex-ante CBA evaluations can, and do, mean the difference between projects ever coming to fruition. Annema evaluated 13 CBAs that had been carried out in preparation for project appraisal. The Dutch Government stipulated in 2000 that all major infrastructure projects would be appraised using CBA and Annema questions the validity of these appraisals and asks why CBA should be preferred to Marginal Cost Analyses (MCAs). The simple answer to this lies in the political implications of MCAs and the controversy that may arise from the appraisal yet, as Annema points out, on evaluation of the CBAs carried out since 2000, half are questionable and as politically controversial as an MCA. It is the belief of the authors that CBA methodology in the Netherlands has yet to achieve its full potential and the lack of transparency surrounding the CBA methodology means projects are often shelved on the grounds of cost value. If the inputs had been less generalised, and transparency achieved, they could potentially have been carried out in a more stringent and less politically inclined manner giving a set of robust costs and benefits to contribute to the decision making process. It could therefore be argued that relying on cost benefit models as the deciding factor in new infrastructure projects may prevent major socially and economically favourable projects being carried out.

Annema (2007) does not rule CBAs out as a robust methodology for cost calculation but rather points to the weaknesses of the methodology when care is not taken with deciding which costs are included and how they are assessed. It was found, though, that CBAs had made a significant contribution to cost evaluation by ensuring inputs were appraised using the same

scenario and if transparency was achieved the results ensured the decision making process was better informed. Leleur (2001) tried to tackle the problem of differences between CBAs and MCAs by using them as 'anchors' for a composite modelling assessment (COSIMA) to examine the costs and benefits of transport projects specifically (Leleur, 2001). The research was again carried out in The Netherlands as a response to Government intervention and aimed to assist decision makers in exploring appraisal in a more systematic way. The main difference here is that a COSIMA model is tailored to the appraisal case in question rather than using a more generic set of parameters. COSIMA adds to the CBA parameters and can influence the end result and turn a project deemed not-worthwhile through CBA into a valued proposal (Riley, 2011).

So far the majority of cost benefit literature has looked at the methodology and outputs in relation to reliability and robustness. Many CBA evaluations have taken place on small scale transport projects with clearly defined aims and objectives but, calculating the cost of large infrastructure projects needs to be considered in similar ways but, for the compensation of generalising certain costs. Vickerman (Vickerman, 2007) addresses these challenges and finds the main difficulties tend to be those of forecasting over long time periods, dealing with imperfect competition in transport-using sectors to obtain estimations of wider transport benefits, introducing private finance, and appraising network effects. Although CBAs are not discounted as a method of identifying costs and benefits they should not be considered in isolation from other complementary approaches, such as computable general equilibrium modelling[6], which may have a useful role to play for very large or network projects. The main concern is with the inputs into the model for a CBA. Differentials within the inputs due to assumptions and estimations may, over a large project, over or under calculate the true costs or dilute the impacts over the infrastructure project to the point that careful consideration needs to be given to the validity of the final results.

The Netherlands have been a central point for cost benefit research and rail infrastructure projects, just as it has been for road. Van Wee (2007) looked to tighten up the variables that were included in the analysis and found that many CBAs, when determining the benefits, often missed opportunities that may have changed the final conclusions. He recognised that cost over-runs were common in rail infrastructure but coupled with only half of benefits being included in the analysis led to a bleak picture for future rail infrastructure growth (Van Wee,

[6] Models that use actual economic data to estimate reactions of the entire economic system to policy changes

2007). Van Wee challenges the practice of comparing through cost benefit analyses of using a 'do nothing' scenario and suggests that comparisons should instead focus on an alternative project that delivers the same, or similar, outputs.

When CBA is used for large infrastructure projects it is useful to have the availability of international benchmarking, especially if the proposed project is something that has no comparison in either the specific sector, or industry in general, as in the UK. Due to the speed and sheer size of the privatisation initiative of the rail industry in Great Britain there have been little opportunities to compare work with other countries. Network Rail (NR) and the Office of Rail Regulation (ORR) have been conflicted over efficiency savings deemed necessary to bring the infrastructure owner into line with European contemporaries. The ORR has carried out various international comparisons with regard to asset management (Opper, 2004) and the Institute for Transport Studies carried out international benchmarking of maintenance and renewal costs (Engles, 2009). The reports culminated in the publication of PR08 and led to ORR insisting on efficiency savings to be made during CP4. Network Rail continue to remain doubtful that comparisons with European and International counterparts can provide benchmarks from which efficiency targets can be set but further work is continuing in this area.

Smith (2009) looked at how International benchmarking of costs could be addressed in terms of comparing cost efficiency in the work of Network Rail. Using the Periodic Review 2008 (PR08) of Network Rail (NR) Smith et al. used top-down econometric techniques coupled with bottom-up engineering analysis to compare NR with other international infrastructure companies. One of the main issues that this research found was the need for good quality and continuous data. It was found that the actual timescales needed to complete the data collection and analysis were long and consideration was needed when extrapolating data – data must be compared to a variety of other evidence sources and estimates must be conservative (Smith et al., 2009). A final point for consideration must also be the natural anomalies in data that will impact significantly on the data set from one country but not on another – Hatfield is a good example of this.

Most of the actual research that has concentrated on ascertaining the costs and benefits on the railways has been aimed at a specific part of the railways, the impact of an event, or a small time frame. One project that has looked at an ex-post cost benefit of a railway privatisation initiative is that of the Canadian railways by Boardman (Boardman et al., 2009). The Canadian railways are mainly freight, rather than passenger as in Britain, and only one

aspect of the railways was privatised – Canadian National Railways (CNR) – not the Canadian Pacific Railway (CPR). This gave Boardman an advantage over other ex-post CBAs in that he had a readymade counterfactual to compare to, although, with competition coming in the form of the newly privatised CNR, there would be a case to argue that the CPR would have increased cost efficiency and quality of service to be able to compete in a commercial setting and may not be taken as a true counterfactual of non-privatisation.

Boardman uses the methodology of Jones (Jones et al., 1990) - where Social Welfare is equal to the total value of privatised industry minus the total value of the nationalised industry plus the sale of the industry – to identify the welfare benefits and uses changes in capital expenditures as well as changes in operating costs to determine the costs to the stakeholders. It is important to remember that where many CBAs will use data extrapolated from actual data prior to the initiative, Boardman uses data extrapolated from the differences between the two railway companies and estimates the forecast in line with the actual data from the 'other' railway company. This has the advantage of following anomalies in the data caused by the national economy and actual events but also assumes that the companies would have continued to have performed in the same manner had privatisation not gone ahead. There is a strong argument for this to be preferable as long as the pre-privatised industry performed in the same way for a period of time and did not deviate when faced with outside influences and political and economic challenges, but it does assume CPR is an appropriate control.

Boardman's final analysis of the Canadian privatisation initiative arrived at similar results to Pollitt and Smith's (2002) analysis of the British railway privatisation apart from the restructuring costs which were much higher in the UK. Where Boardman's research differs the most from the CBA in this thesis is with the actual purpose of the CBA. Although Boardman's research is also looking to ascertain the welfare gains from the CBA process, this research is also concerned with explaining the exponential rise in passenger kilometres as being a direct result of the privatisation process. The Canadian railways did not increase in size or service or price therefore any gains attributed to the privatisation process are purely efficiency gains and will amount to a net gain for all stakeholders.

Few larger scale CBAs have existed on the privatisation of the rail industry in the UK and those that have been carried out tend to look at the immediate time frame around the privatisation process. The work of Pollitt and Smith (2002) on rail efficiency savings used CBA to assess where the savings, if any had been made, were felt. They found costs had risen by £2.9bn between 1999/00 and 2001/02 and noted that the preliminary results for the following year

were indicating further increases. This suggests that the Hatfield crash in 2000 had a greater and longer lasting effect on the rail profits than previously thought and is an opportunity for this research to follow through on. The paper focuses on safety as a benefit to service quality and finds little empirical basis for the continuance of further spending on safety as the impact was shown to be limited. Although the ORR have issued enforced efficiency savings on Network Rail to try and reduce the costs to pre-privatisation levels, Smith points out that the cost base for the efficiency gains - as set by the ORR – is 27% higher than the cost base at the point of the Hatfield crash. Any reductions in costs through achieving efficiency gains would have to be considerably higher than the amount enforced for the savings to bring costs down to anywhere close to privatisation levels.

The CBA carried out omitted capital costs due to the problems of establishing a counterfactual scenario, although they did provide separate accounts for these costs both before and after privatisation. The approach used for the CBA is that which was originally developed by Jones, Tandon and Vogelsang (1990) and as we have seen so far in this literature review it is probably the most widely used and the one that will be adopted by this research. The first task is to assess the welfare change before allocating it to the different stakeholders – consumers (users), producers (operators) and the government. The same principals are used in the research by Boardman (2009) with the exception of the costs. Pollitt and Smith derive the industry costs as the difference between the total revenue received less the actual operating profits. Under normal circumstances this would not provide an accurate account of the actual costs for a counterfactual scenario to be developed from but as this research is concerned mainly with operating costs, and inherent problems with measurement and comparability prevent the majority of railway efficiency studies from using capital costs, they address the issue through discussion on capital investment levels and the changes that have taken place and the efficiency of the cost of capital investment (project management). Rail infrastructure projects are often over budget and often run over time, something that has not changed to any significant degree since privatisation.

It should be noted that Smith's methodology for ascertaining costs and benefits of the rail privatisation is similar to this particular research except this research is looking at a much longer time scale and also seeks to explain the increase in passenger kilometres. Smith continues with the theme of cost implications in his paper on rail industry cash costs and the implications of the Hatfield crash (Smith, 2006). Here, the focus is on total costs and Hatfield features significantly as an area of increasing costs and how reasonable these costs are. The

paper takes two significant timescales – from privatisation to Hatfield and from 2000/01 to 2001/02. The second time period they describe as post-Hatfield but more recent research has questioned the time frame for post-Hatfield and argues for a longer period. They do, however, use benchmarked productivity levels from previous periods when similar maintenance and renewal programmes were in force, namely the 1970s.

Their results include the comparisons of post-Hatfield costs with historical events but the main focus of interest lies in productivity and the impact of changes in track renewal (a main feature of Hatfield). The paper again looks at safety measures as a reason for changes in productivity trends but finds that incorporating them into the final analysis did not produce reportable results. Smith recognises that the Hatfield crash has had a significant and longer lasting effect on the rail industry than previously thought and suggests that benchmarking should be a priority feature of further research (Smith, 2006).

Since this thesis has been developed and completed there have been developments in time series analysis of the rail industry in Great Britain and the recent work by Whelan and Harvey (Whelan et al., 2010) has explored the relationship between variables and the impact of long-term trends in terms of the economic, demographic and competition variables as well as service and fares (Whelan et al., 2010). Although their inclusion of quality measures and fuel costs extends the parameters of the model their findings support the analysis of this thesis and provide a benchmark for comparison that will be explored further in the next section.

## 3.4 Relating Cost Benefit Analysis to this Research

The literature has highlighted an assortment of potential issues with carrying out CBAs and these issues must be addressed, even if they cannot to be solved. One of the main issues is that of forecasting over long time periods (Vickerman 2007). This research aims to take a 30 year time period as the basis of the pre-privatisation, transition, and post privatisation period – this is a considerable time period to take, and one of the unique features of this research. There are various methodologies that have been tested that try to address the issues around developing a counterfactual argument that corresponds to a plausible scenario.

Developing a counterfactual argument for the model requires some sort of estimation of likely trends. It was decided to use a simple moving average scenario based on previous data trends. There have been many attempts at designing models that will accurately forecast by reducing ‘noise’ (i.e. irregular events that impact on an otherwise smooth trend). Linear methods try to

model closely underlying subsystems and require the identification and measurement of several features such as seasonality, cycles and irregularities. Non-linear methods exploit measurement data and mimic dynamic systems without the need for understanding the underlying processes (Camilleri, 2004). Although a linear trend is commonly assumed in time series forecasting, as it is here, empirical research shows this is a reasonable assumption only at short horizons (Gardner and McKenzie, 1985). The longer the horizon, the more likely a linear trend will be to overshoot the data – mainly due to unforeseen events. Overcoming this problem can be tackled by dampening the trend through the introduction of an extra parameter (González-Páramo and De Cos, 2005).

Studies of forecasting have shown that the most common methods used by researchers, such as simple regression and Box-Jenkins, do not, in hindsight, necessarily give the best forecasting results. The main reasons given for the widespread use of these methods are that they are easily understood, relatively simple to use and they do not require complex software (Collopy, 1992). An alternative approach to trend extrapolation is Lewandowski's FORSYS system (Cowie, 2001), which damps the trend in every time series according to the level of noise. According to Gardner and McKenzie, the results derived from this approach seem to fall short each time (Gardener and McKenzie 1985), and especially when there appears to be a strong trend, Lewandowski's forecasts tend to track well below the data at long horizons. This method also achieves good long-range performance although at some cost in short-range accuracy. Alternatively, the Parzen methodology (ORR, 2011), which may be the most robust approach reported to date, is considered to be too complex for use in large forecasting systems (Gardner and McKenzie, 1985).

It is important for the analysis that all data is treated in much the same way – costs and benefits will only be comparable if the data that is used is the same and the methodology consistent. This includes using the same dates for estimations and calculations and the same parameters i.e. if revenue per passenger kilometre is used for one model it should stand to reason that it is also used, and not replaced with another data set such as revenue, in other models.

An outcome of this research is the development of a simple regression model to ascertain the forecast for passenger kilometres. The model is only used in the benefit section of the CBA and not in the cost section. Benefits are also attributed to passenger kilometres as this is the increase that is being explored. Costs are attributed to train kilometres as it is here that the

cost falls. That said, when estimating change in the parameters during this research care is taken to ensure the modelling remains comparable.

One other methodological issue that is worth mentioning is the model that was used by BR to estimate the impact of projects and infrastructure enhancements (Gwilliam, 2008). Before privatisation, each BR business had a model to forecast traffic and revenue. For Network South East the model essentially relied on central London employment as this was the main income generator – commuters. Intercity utilised a different model in the form of:

**Change in IC revenue = A(change in GDP) – Y**

Where Y was a constant that reflected the increasing dispersal of population away from stations, and reduced rail competitiveness compared to road as a result of road building and increased car ownership. Developing a model for each sector is an issue that was considered during the initial thesis development but the main problems associated with this are issues of comparison and data availability. Changes in the sector boundaries and responsibilities and accounting procedures make it difficult for a disaggregated cost and benefit model to be taken advantage of.

## 3.5 Conclusion

The conclusions made in Vickermans (2007) paper on forecasting over long time periods are worth considering and may need accounting for within this research due to the size of this project and the network that is to be covered. Rail network routes will have different impacts and levels of use therefore the final costs will need to be aggregated over the whole network and cannot be isolated to specific routes.

One of the most widely used approaches for CBAs is that which was originally developed by Jones, Tandon and Vogelsang (1990). It assesses the welfare costs and attributes them to the stakeholders. In this research these are the consumers (Users), Operators, and the Government (also non-users). This enables the specific benefits to be assessed against the stakeholders and will aid the narrative surrounding the final analysis.

We have looked at the process of privatisation, the reasons that privatisation was carried out, and have garnered an understanding of the methodologies that have been utilised in order to understand these impacts on the rail industry. Now it is important to understand the long term trends of the rail industry and the impact that other transport modes may have had on

the increase in passenger kilometres. The next chapter looks at these trends and draws out those variables that will be important to understanding the changes in demand that have occurred.

# 4 Rail Industry Trends

## 4.1 Introduction

The last 30years of the rail industry has seen considerable changes in the way they are run and the service they provide. This has coincided with changes in political policy, environmental awareness and economic growth. However, analysing links between changes in the rail industry and these broader contextual factors raises considerable challenges for analysis. Not the least problematic is the fact that data for the industry comes with inherent problems regarding its character, collection methods, and timescale of availability. In order to be able to justify the assumptions made in the cost benefit analysis it is important to clarify these data anomalies and find the specific trends that relate to the growth in the industry. The purpose of this chapter is to look at the trends that have appeared in the different areas of the industry - such as region, sector and ticket type - and to try and attribute them to the various events that have occurred. This will set the scene for the next two chapters that will look at how much of the unexplainable changes can be attributed to the privatisation initiative. External influences will also be explored to find which factors impact on growth in the rail industry, where they impact and to what degree. Explaining growth and applying predictions can only be carried out with any degree of success if a general understanding of where the growth has occurred, and what may have contributed to it, has first been ascertained.

The first section will look at the data that has been collected and where it originated. The rail industry trends will follow and subsequent sections will highlight the external influences including the impacts of other transport modes on the industry. The majority of the trends look at a span of 30yrs from 1979 to 2009 (where data allows) but some of the modal comparisons can be seen from 1952 thereby spanning more than 50yrs.

## 4.2 Data Used in the Analysis

Data for the rail industry is collected and distributed by different agencies for differing purposes. The method of data collection has changed over the years as the industry has evolved and the responsibility for data collection has also changed. This in itself is problematic in the sense that consistency of data collection is difficult to achieve over long time periods. The main body for transport data is the Department for Transport (DfT). They issue guidance on data collection methodology and provide a policy framework for the collection process and reporting structure. The railways are heavily regulated and cost containment has always

played a large part in the formulation of what is essentially a loss making industry (Jupe, 2005, Pollitt and Smith, 2002). To this end, the Department of Transport provide various guides and strategies to help rail companies strategically plan future rail improvements in a cohesive and standardised way[7].

All data for rail is collected from the industry central ticketing system LENNON. Quarterly dates start from the beginning of the financial year rather than the beginning of the calendar year therefore quarter one is for thirteen weeks beginning in April. All data is rounded to the nearest two decimal places and revisions are made at the end of the financial year to take account of Train Operating Company (TOC) specific tickets and Passenger Transport Executive (PTE) multi-modal tickets. The LENNON system collects two types of data: Pre-allocation (Sales) and Post-allocation (Earnings). The National Rail Trends[8], a main user of the LENNON data set, uses the post-allocation data set. Allocations are created from an 'opportunity to travel' mathematical model using origin and destination timetabled information.

Rail statistics consist of data on a broad range of topics including rail usage, performance, fare increases and safety. The National Rail Trends (NRT) is a main source of information for rail trends, and has, since 2008, been produced on a rolling basis rather than an annual publication (ORR, 2009c). Other publications from the Association of Train Operating Companies (ATOC) and Network Rail (NR) complement and contribute to the resources available, as does the Transport Statistics Great Britain, published by the Department for Transport (DfT), which includes data for all modes of transport (DfT, 2009c). Prior to the ORR reportage of statistics the Strategic Rail Authority (SRA) collected and published the data. Data collected before 2000 was published by the DfT. All graphs use the NRT data unless otherwise stated.

## 4.3 Rail Trends

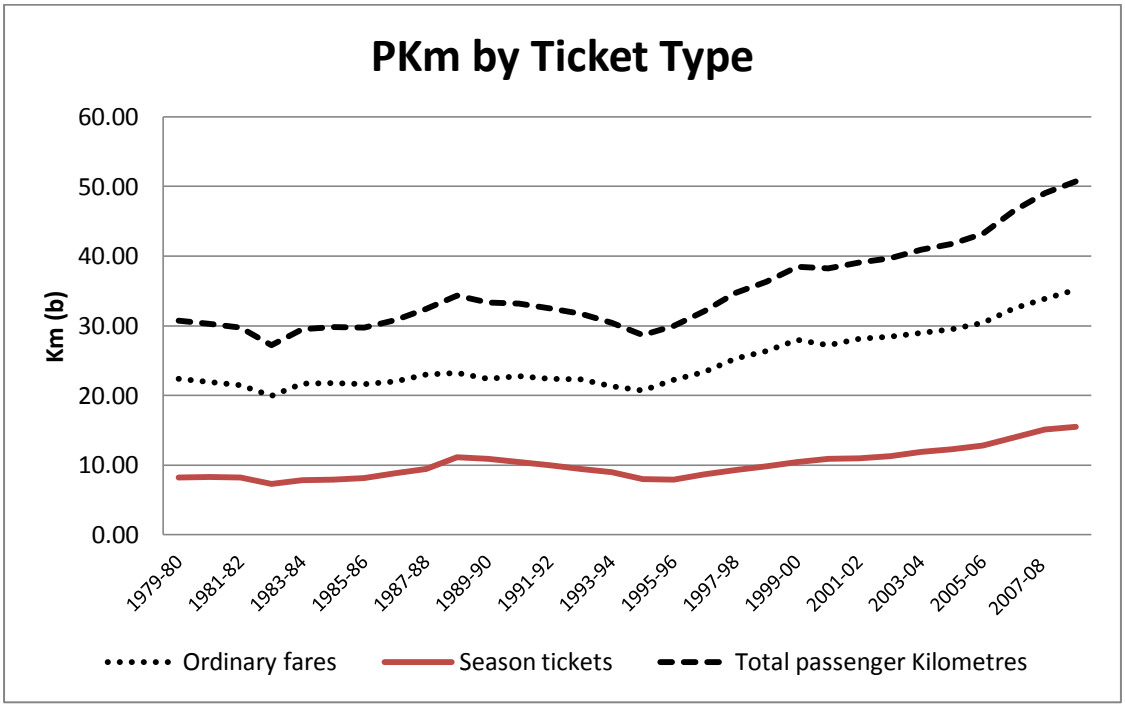
This section looks at the trends in the rail industry and those external factors that contribute to changes in rail patronage. Initially, the data specific to the rail industry is studied, followed by the incorporation of other social, economic and political factors.

[7] Webtag, in particular, is a primary source of research methodology for rail provided by the DfT.
[8] Published by the ORR as an annual publication with regular updates throughout the year, including quarterly publications.

### 4.3.1 Passenger Kilometres (PKm)

The most common gauge of growth in the rail industry is Passenger Kilometres (PKm) (Nash, 2002, Shaw et al., 2003). It is the growth in PKm that this research seeks to explain. The data for PKm is expressed as the total amount each year, and each quarter, for all Operators and is also disaggregated into Sectors: Long Distance, London & SE, and Regional, and Ticket Type: Ordinary Fares and Season Tickets (ORR, 2008a). Since privatisation in 1995/96 there has been considerable growth of almost 70% in the amount of PKm (ORR, 2009b). Levels of PKm are now the highest they have been since the 1950s on a network that is 40% smaller (ATOC, 2005). Figure 4-1 shows the trend in PKm over the 30yr period from 1979 and highlights the upward trend that has been apparent since privatisation.

**Figure 4-1 Passenger Km by Ticket Type**




The most significant rise has been seen in the sale of ordinary tickets. The slight dip in trend in 2000 is assumed to be due to the Hatfield Crash in October 2000. This major accident was caused by faulty infrastructure and led to a consistent and protracted speed restriction on the whole network. Figure 4-2 highlights the considerable effect that the Hatfield Crash had on passengers purchasing ordinary tickets. This would be due to the spontaneity of ordinary ticket sales compared to the long term commitment of season tickets. Season tickets, therefore, are likely to be slower in reacting to a change in the economy but once recognised, they take longer to recover. Season ticket holders had less choice in choosing their mode of travel since season tickets are bought in advance and the majority of journeys involve travel

into London. This is one possible reason that the Hatfield Crash shows little impact on this type of ticket.

**Figure 4-2 Passenger Km by Ticket Type Using Quarterly Data**

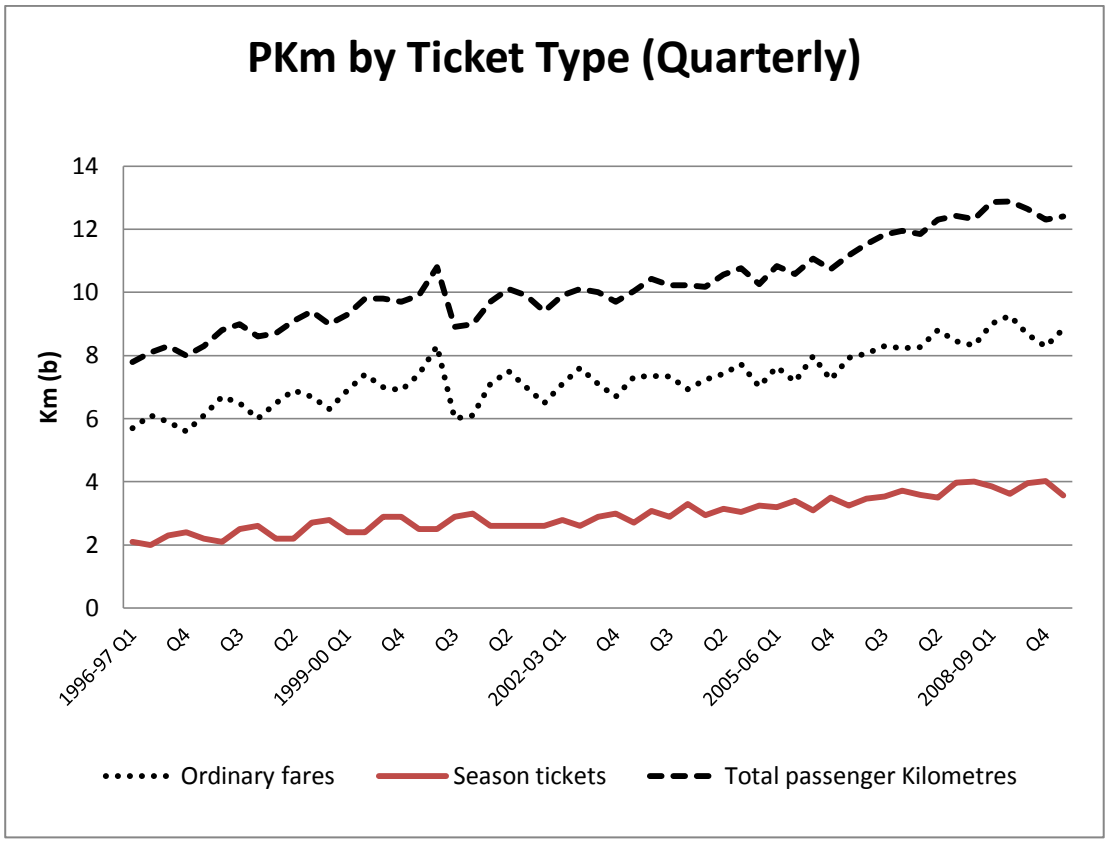
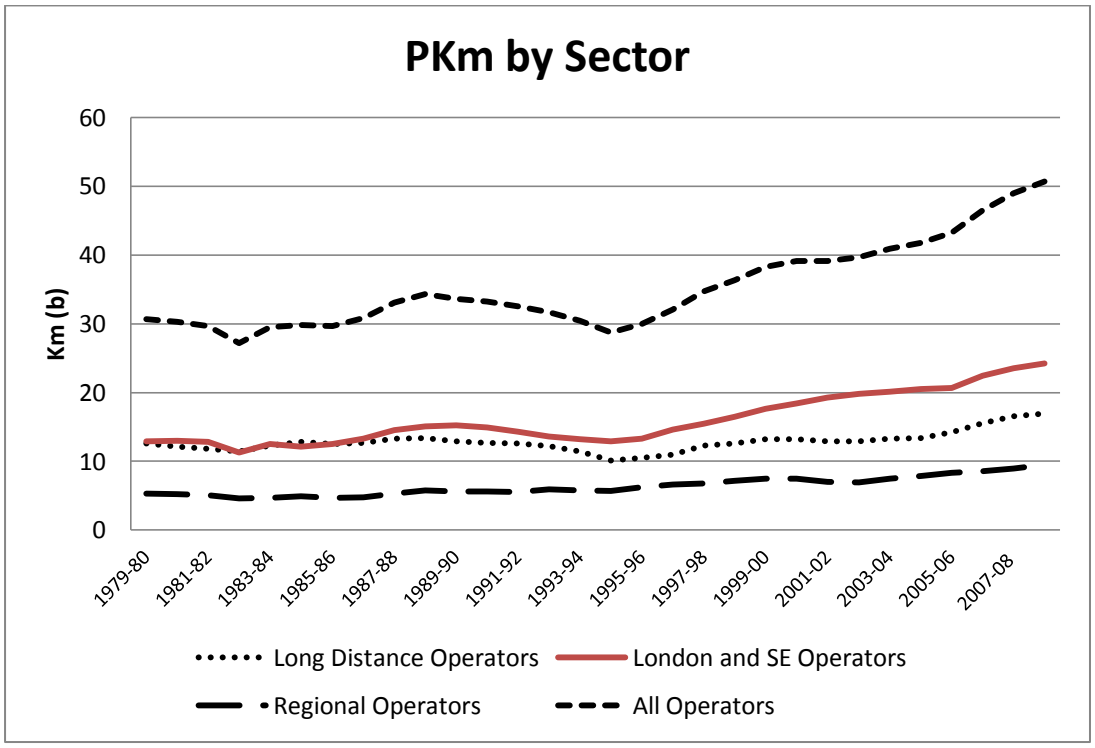



Figure 4-3 shows the trends in PKm disaggregated by sector. The main increase appears to be in the London & SE sector, although all sectors have shown an increase since privatisation.

**Figure 4-3 Passenger Km by Sector**

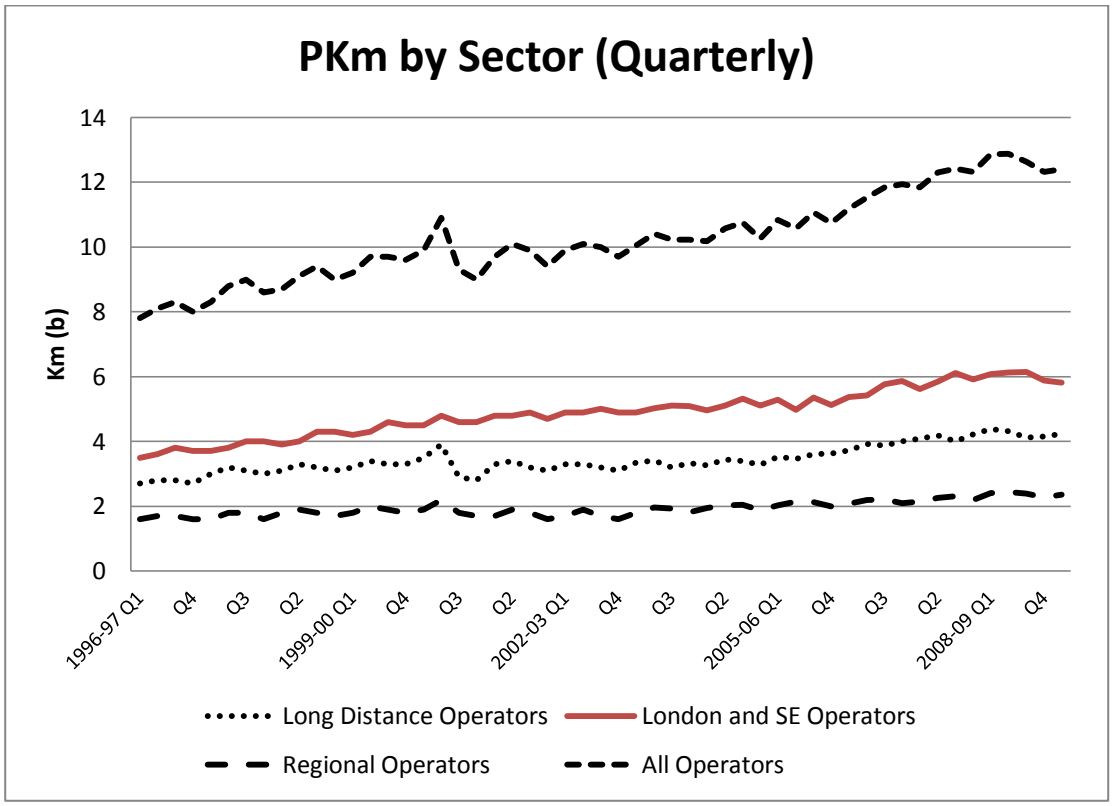



Between 1982-1984 there was a dip in PKm which represents the strike action by British Rail workers and the economic recession of the era. The recession of the early 1990s seems to have been swallowed up in a general decline in the industry from 1988. The reverse in trend towards growth occurred prior to the actual privatisation of the industry and is an area that requires further investigation. The upward trend in PKm could be due to the privatisation effect occurring once the decision to privatise was made (1992)[9] but could also be due to the early impacts of the 'Organising for Quality' initiative which began in 1990 and was the first major attempt by BR to commercialise and streamline the rail industry by focussing on customers and profit (Gourvish, 2002b).

There is little evidence in the graph of the impact of the Hatfield Crash on the sectors. Figure 4-4 show the quarterly effect on the PKm and shows that the impact of Hatfield appeared to be concentrated on the Long Distance sector, further highlighting that the majority of Season Ticket holders commute into London thereby causing minimal fall in PKm in the London & SE sector.

[9] The 1992 White Paper 'A New Deal for Transport – Better for Everyone' set out the intention and methodology for a privatised rail industry.

**Figure 4-4 Passenger Km by Sector Using Quarterly Data**




The decrease in the regional PKm after Hatfield underlines the significant impact that the accident had on the network as a whole, rather than just in the localised area. For how long, and to what depth, this event impacted is an area that will be questioned in the analysis chapter of this thesis.

Growth prior to privatisation was negligible, showing a peak in 1988/89 of 11.73% falling off to – 6.51% in 1994/95. There has been a 69% increase in PKm since privatisation but an overall increase of 65% over the 30yr time period that is being studied. Table 4-1 shows the total percentage increases in the PKm over the time period studied and both pre- and post-privatisation.

**Table 4-1 % Increase in Passenger Km**

| | Over 30yrs | Pre Privatisation (1979/80 – 1994/95) | Post Privatisation (1995/96 - 2008/09) |
|---|---|---|---|
| **Ordinary Fares** | 57.14% | -7.59% | 58.56% |
| **Season Tickets** | 89.02% | -2.44% | 96.02% |
| **Long Distance** | 34.72% | -19.84% | 61.66% |
| **London & SE** | 87.76% | 0% | 82.12% |
| **Regional** | 79.28% | 7.55% | 53.26% |
| **Total** | 65.15% | -6.51% | 69% |

Source: NRT 2009

It is clear from the table that the vast majority of growth in the PKm has occurred since the privatisation initiative. Only the regional sector saw any consistent growth over the whole period. All sectors have shown significant increase in Pkm since privatisation and the sale of season tickets has almost doubled. The data set PKm shows how many Km are travelled each year - or quarter - by passengers but not how many passengers travelled or the distance the journey taken. It could therefore be that the same passengers are travelling further, or more passengers are travelling far more frequently.

### 4.3.2 Passenger Journeys (PJ)

In order to clarify that there has been growth across the industry the previous trends need to be compared with the data set 'Passenger Journeys' (PJ). There are problems with the accuracy of the PJ data due to the definition of a journey. If a journey requires a change of trains then it is counted as two journeys and return trips are also counted as two journeys. Therefore a return journey requiring three changes each way will result in a total of eight journeys being accounted for. The ORR recommends this will cause an inflation of 5% in the total number of journeys calculated (ORR, 2009c). Even when this anomaly is accounted for it is still clear that there has been significant growth in the amount of passenger journeys since privatisation although the increase in Ordinary Ticket Journeys started prior to the privatisation in line with the PKm growth. Figure 4-5 shows the trend in Passenger Journeys over the period studied.

**Figure 4-5 Passenger Journeys by Ticket Type**

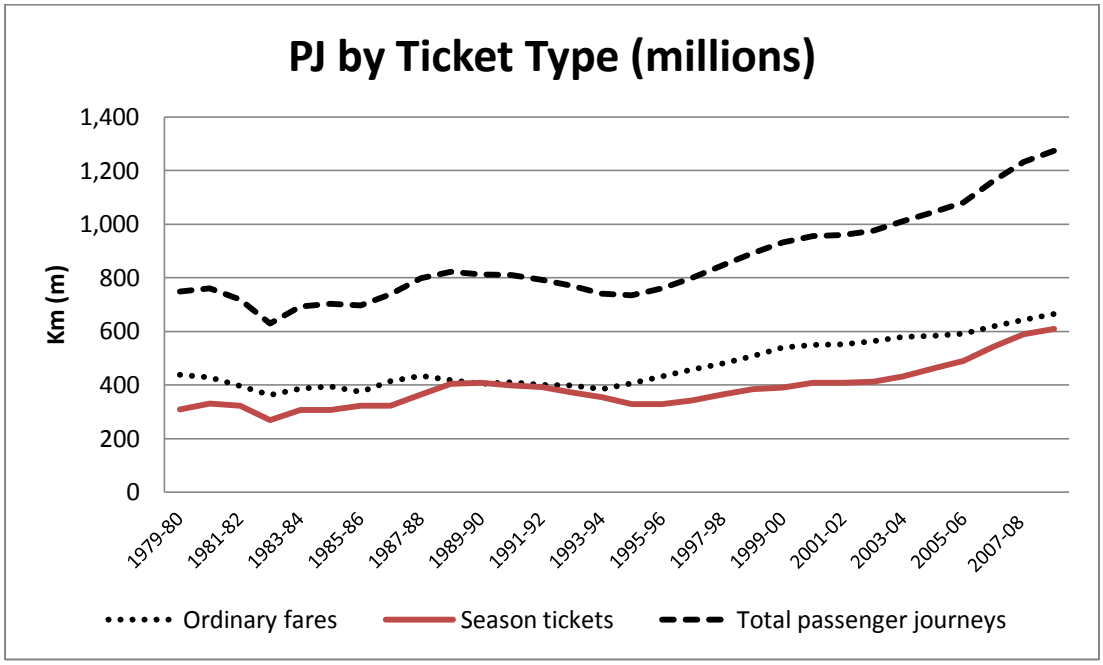
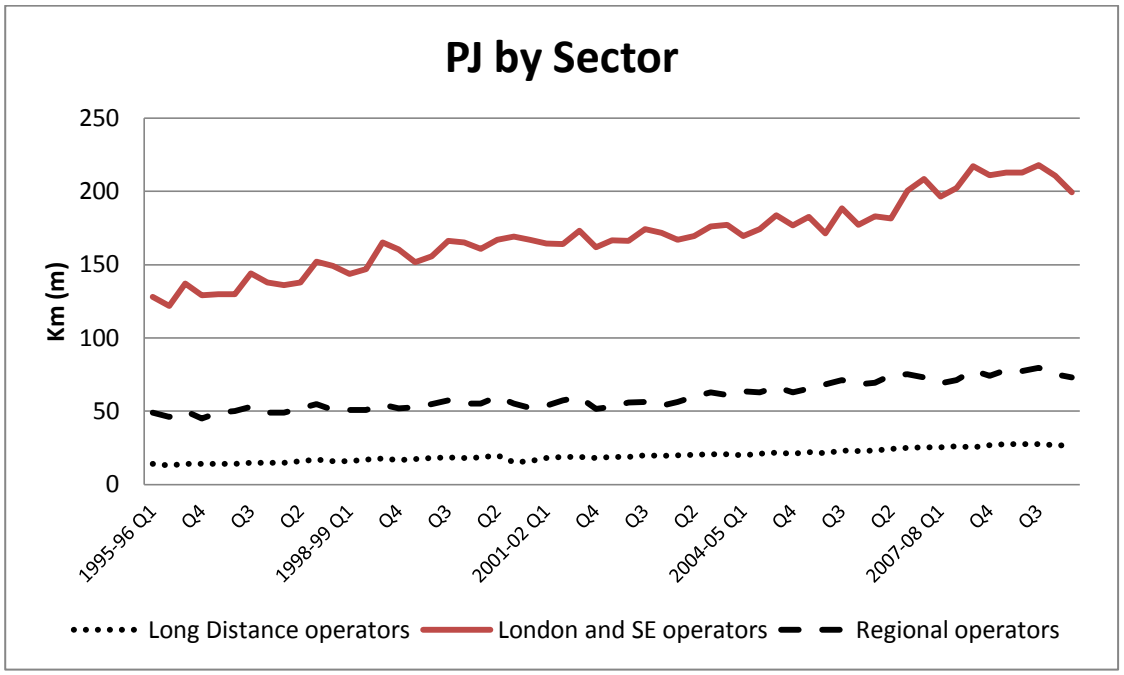


Figure 4-6 shows the trends in PJs since privatisation disaggregated by sector and quarter years. The London & SE sector is more susceptible to changes and shows a clear seasonality effect.

**Figure 4-6 Passenger Journeys by Sector**




The graph appears to show that the London & SE sector experienced the highest growth since privatisation, yet Table 4-2 shows that on a percentage increase basis the Long Distance sector has seen growth of more than 100%. When compared to the PKm % increases it is apparent that, although more journeys were taken, they were not necessarily longer journeys. This could be due to the definition of a journey or, as mentioned earlier, more passengers travelling shorter distances.

**Table 4-2 Passenger Journey growth and % increase since Privatisation**

| | Long Distance operators | London and SE operators | Regional operators | Total pass journeys | % Increase in Long Distance operators | % Increase in London and SE operators | % Increase in Regional operator | % Increase in Total pass journeys |
|---|---|---|---|---|---|---|---|---|
| **1994-95** | 54 | 502 | 179 | 735 | 0 | 0 | 0 | 0 |
| **1995-96** | 56 | 516 | 189 | 761 | 3.33% | 2.85% | 5.80% | 3.56% |
| **1996-97** | 59 | 542 | 200 | 801 | 9.78% | 8.01% | 11.79% | 9.02% |
| **1997-98** | 64 | 576 | 206 | 846 | 17.65% | 14.69% | 15.45% | 15.05% |
| **1998-99** | 67 | 616 | 208 | 892 | 24.98% | 22.78% | 16.38% | 21.34% |
| **1999-00** | 72 | 639 | 220 | 931 | 33.46% | 27.25% | 23.11% | 26.65% |
| **2000-01** | 70 | 664 | 223 | 957 | 29.15% | 32.29% | 24.57% | 30.14% |
| **2001-02** | 74 | 663 | 222 | 960 | 37.16% | 32.14% | 24.27% | 30.54% |
| **2002-03** | 77 | 679 | 219 | 976 | 43.02% | 35.28% | 22.60% | 32.71% |
| **2003-04** | 81 | 690 | 240 | 1,012 | 50.88% | 37.47% | 34.34% | 37.64% |
| **2004-05** | 84 | 704 | 256 | 1,045 | 55.04% | 40.34% | 43.39% | 42.11% |
| **2005-06** | 89 | 720 | 273 | 1,082 | 65.70% | 43.37% | 52.69% | 47.22% |
| **2006-07** | 98 | 773 | 292 | 1,164 | 81.59% | 54.01% | 63.53% | 58.30% |
| **2007-08** | 104 | 833 | 294 | 1,232 | 93.47% | 66.00% | 64.68% | 67.64% |
| **2008-09** | 109 | 854 | 310 | 1,274 | 102.60% | 70.19% | 73.55% | 73.33% |

Source: Original data from NRT (DfT 2000/2009)

In general, there have been significant increases in both PKm and PJ since privatisation and it is this increase that does not appear to be easily explained.

### 4.3.3 Passenger Revenue

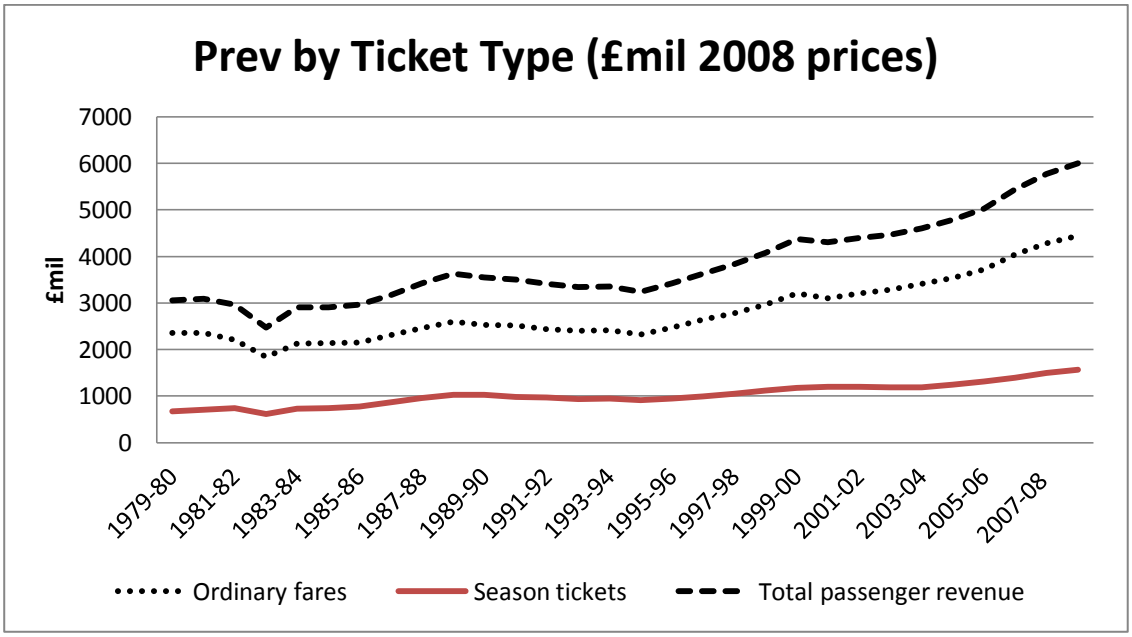
How much a passenger has to pay for their ticket will impact on the amount of passengers that are able to travel (willingness to pay). The Revenue data is collected and adjusted according to Train Operating Company (TOC) special offers and Passenger Transport Authority (PTE) joint modal ticket prices. The price reflects the total cost of the journey and therefore includes the cost of car parking, seat reservations, and other generalised costs paid by the Passenger. Ticket prices are never far from the news headlines and there is a general feeling that prices since privatisation have increased above and beyond what is considered acceptable (Savage, 2009). In January 2009 during one of the worst recessions in recent memory the Operators increased regulated fare prices by more than 6% and in many instances increases of up to 11% were seen on some routes. This perfectly legal price increase was brought about because of the manner in which the regulatory system for fares is managed. The current system allows operators to increase regulated prices by the RPI+1% and, as long as the average percentage across the fare basket is maintained, some fares can

increase more than others. The RPI index is set at the previous July level which in this case was 5%. The fact that the RPI had fallen considerably since July 2008, and by January 2009 was hovering at approximately 1%, was irrelevant to the price setting. Operators, faced with falling revenues due to the deepening recession and the prospect of rising premiums to the Government, felt they could not afford to be lenient with the fare increases. This only accounts for regulated fares though, and in many areas the majority of fares are unregulated and therefore open to increases at the rate decided by the operator.

Changes to the types of fares available were made during 2009 that simplified the ticketing system enabling customers to choose between Standard Tickets, Advance tickets or First Class tickets. Although the aim was to simplify the fare system, when the multitude of railcards, Operator offers and group save tickets are added in there are still a vast array of ticket prices and types for customers to choose from. Concern has also been raised that the majority of cheaper tickets are only available to those with access to the Internet (TSC, 2009b).

For the purpose of collection and reportage the data for ticket type is split between Season tickets and Ordinary tickets (all other tickets). Figure 4-7 shows the increases that have occurred in passenger revenue since 1979 and suggests the concerns about price increases could have a sound foundation.

**Figure 4-7 Passenger Revenue by Ticket Type in Current (2008) Prices.**

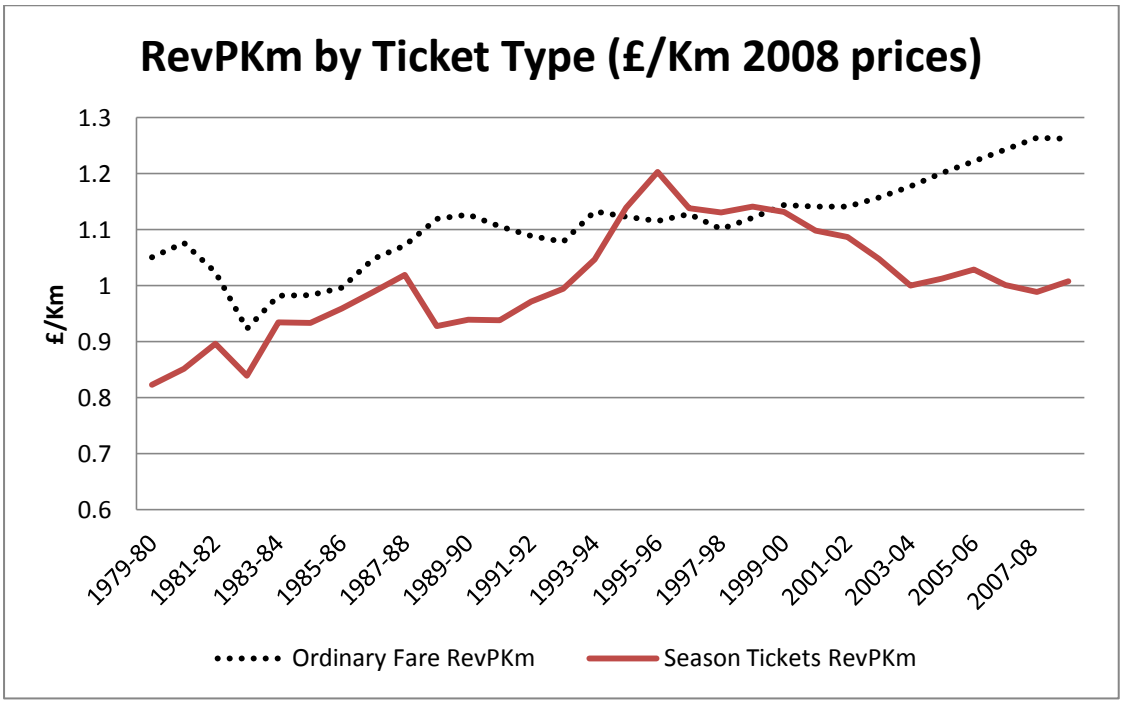



Although there seems to be a significant increase in the amount of revenue that has been generated it is important to remember that there has also been a considerable increase in the

amount of journeys and Km that have been taken. It would therefore be wrong to take pure revenue in isolation and the rise in PKm should be included to see if the revenue increase is a consequence of a rise in the ticket price, a rise in the amount per Km travelled, or the amount of passengers that are paying. Figure 4-8 highlights the revenue according to the ticket type on a £ per Km basis.

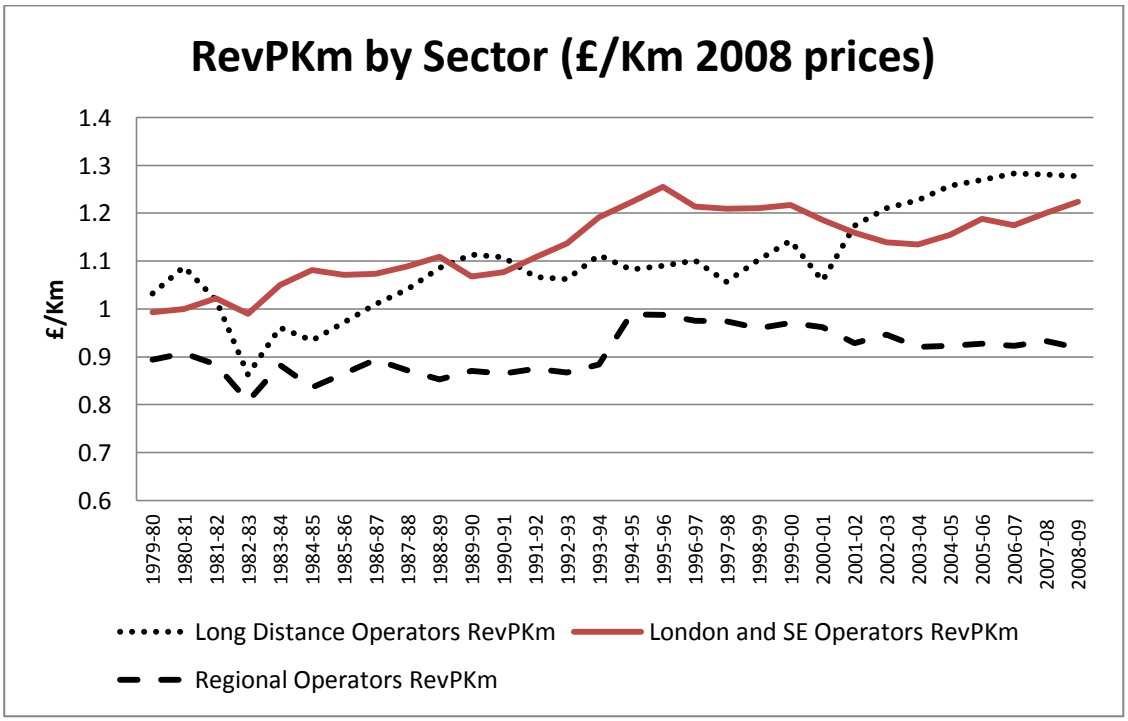
In reality, the fare increases do not appear to be as significant when compared to the amount of PKm. The increases are in Ordinary Tickets and these are generally unregulated. In real terms, the price of season tickets has fallen since privatisation.

**Figure 4-8 Revenue per Passenger Kilometre by Ticket Type (2008 prices)**




When the revenue is disaggregated across the sectors (Figure 4-9) the main increases can be seen in the Long Distance sector. This is interesting when taking into account the low air fares and increase in uplift that has been seen in domestic flights. If prices for rail have gone up, yet more people are travelling, then there must be something else attracting passengers to rail. The section on other transport modes will explore this further.

**Figure 4-9 Revenue per Kilometre by Sector (2008 prices)**




Although there was a decline in the revenue for the London & SE sector from the beginning of privatisation, this trend has since reversed and prices are almost level with pre-privatisation incomes. The data set RevPKm is a useful predictor for willingness to pay, and therefore demand for travel, and will be included in the following chapter where the growth in PKm is explored in more depth.

Revenue increases since privatisation should also take into account the technological advances in ticketing and competitive incentive to prevent 'fare dodging'. Fines for fare dodgers have increased tremendously since the privately owned franchises are critically dependent on the revenue collected through ticketing. Although there has been a significant decrease in some areas of full-time manned stations there has been considerable rolling out of ticket barriers, preventing access without a valid ticket, at all major stations. In a three week period in 2007, 192 fare dodgers had to pay a total of £43,186 in fines in the East and West Midlands after a campaign by Operators to 'Name and Shame' those customers who attempted to fare dodge (ATOC, 2007). ATOC estimate that a reduction from 5% to just 2% of passengers who now manage to ride without payment has been achieved in these areas.

### 4.3.4 Train Kilometres

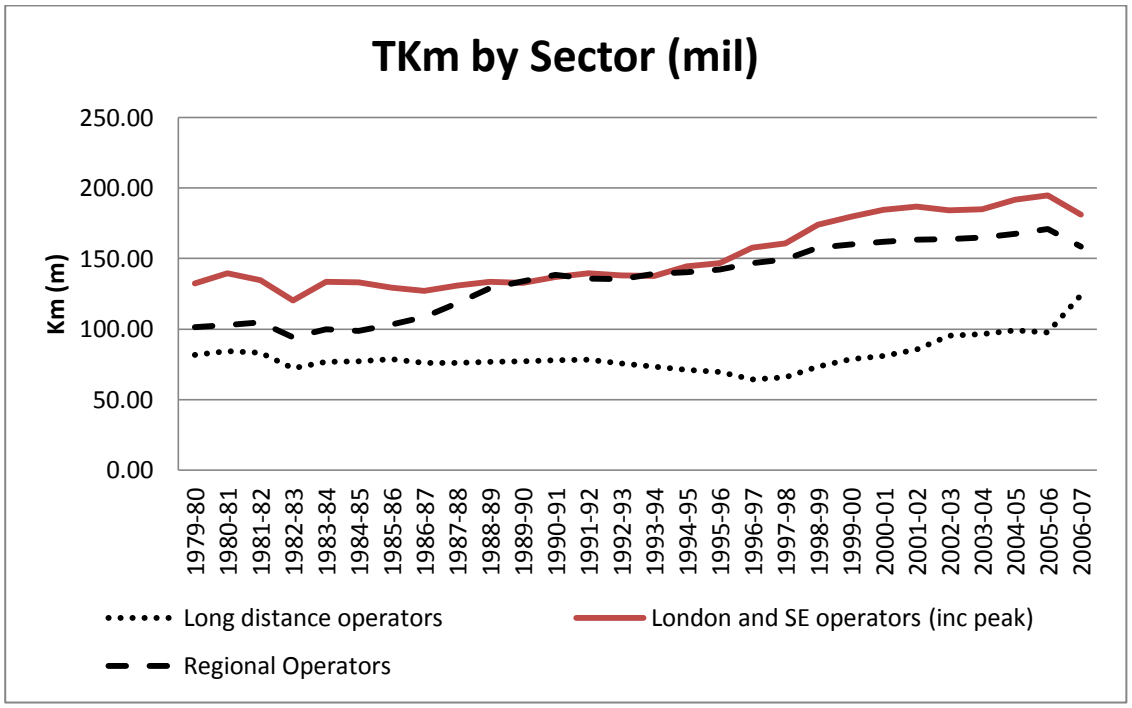
Train Kilometres (TKm) is another data set that impacts on the amount of Km a passenger can travel. TKm gives the total amount of Km that is available to be travelled each year also

further disaggregated into quarter years. There is a potential problem with this variable in that it does not tell us how many trains are travelling, how far they are going, or how much capacity they will hold. Any growth in the available TKm could be due to shorter more frequent trains or an increase in distance that a train travels. This is the only variable that could be used as an indicator of supply as changes in capacity have not been collected for the duration of the research time span and the methodology for the collection has changed making it impossible to compare over time. Lack of capacity is a significant problem in many areas of the country and is due to a variety of problems such as the need for infrastructure upgrades, population density, bottlenecks and general congestion and capacity limits. The Transport 2000 Plan (DfT, 2000) by the DfT aimed to tackle many of these issues but as growth has exceeded investment the majority of improvements have so far done little more than maintain current capacity constraints.

Capacity prior to privatisation was organised on a 'matrix management' system that evolved from the sector management structure of British Rail. 'Organising for Quality' saw the first step in commercialisation and the matrices were replaced by contracts, but as planning was still split across geographical offices there remained much complexity (Watson et al., 2004). Since privatisation, the responsibility for allocating train paths (slots) has resided with the Rail Regulator. This has been seen as a contentious issue within the franchise agreements as bids are planned around the ability to generate revenue in order to pay premiums to the Government. Lack of control over capacity by the TOCs has meant that in some instances adequate revenue has not been achieved. The most sensational case being the fall of GNER East Coast Mainline in 2006 after the ORR awarded Open Access rights to two operators rather than allowing the incumbent franchise the rights (Clement, 2006).

Figure 4-10 shows the changes that have occurred since 1979 in the amount of train Km available in each sector.

**Figure 4-10 Train Km by Sector**




There has been a general increase in the amount of TKm since privatisation but due to a change in the collection methodology it is not possible to disaggregate after 2007. Due to the nature of the data set it is not possible to disaggregate between ticket types. TKm is now collected by TOC rather than Sector and, although an approximate calculation could be made depending on the franchise and route, it is not necessary to disaggregate for the purposes of the main analysis in the next chapter.

### 4.3.5 Investment in the Rail Industry

Now that we have examined a range of critical performance indicators affecting the rail industry, including passenger numbers, journeys and revenue, we can now move on to analyse the related issue of investment in rail. Investment in the rail industry is politically driven and therefore difficult to quantify in terms of outcomes. One of the objectives of the privatisation initiative was to reduce costs by generating competition (Harris and Godward, 1997, Gourvish, 2002a). How the industry is funded is a complex and politically challenging exercise. Payments are made to Franchises in the form of subsidies on non-commercial routes. Grants are paid to PTEs (recently changed to Integrated Transport Authorities ITAs) that are then used to fund local initiatives and enhancements in rail through franchisees. Infrastructure is maintained through the High Level Output Specification (HLOS) and funded through the Statement of Funding Allocation (SoFA). Transport for London has recently been given enhanced responsibility and power to stipulate specific service requirements extending

out of the Greater London boundary and has also taken on all stations within this area thereby granting access to franchises with the aim of maintaining consistency of quality of service (DfT, 2007b).

Prior to privatisation the funding for all investment came from the treasury or through capital loans. Expenditure was closely monitored and capital grants reduced or increased for political and economic reasons rather than sound business reasons. Until 1998 the spending review was set on a yearly basis making long term investment difficult to plan.

Tracking and separating the investment into rail over a 30yr period is a challenging task. The document National Rail Trends gives a breakdown of funding for the period but due to the changes in how rail has been supported there are many changes to funding categories both in name and substance. There has been considerable in-depth study of investment over the last few years (Smith, 2006, Pollitt and Smith, 2002, Gourvish, 2002a) and a wealth of data now exists to support and underpin further inquiries. Since privatisation Investment can be disaggregated into two sectors: Operating costs and Infrastructure investment. Operating costs include support to franchises and grants to Passenger Transport Executives (PTEs). Infrastructure investment is mainly covered under the Control Period Review spending (currently CP4), and government funded initiatives such as Crossrail and High Speed Rail.

Support to franchises is set out during the franchise bidding process. The initial failure of over half the first 25 franchise awards and the later trend, by the DfT, to ward off failure by renegotiating, meant that changes were made to both income and expenditure estimates. Since the failure of GNER in 2006 the DfT has refused to renegotiate on bids. Lord Adonis, the previous Labour Secretary of State for Transport, told the Transport Select Committee on the 17th June 2009, that the DfT would not renegotiate, and they would withdraw other franchises from any franchise that failed, and refuse an Operating Company the chance to bid on future franchises (TSC, 2009b).

Table 4-3 gives an example of a funding stream set over a franchise period for the South Western franchise.

**Table 4-3 Franchise Payments and Subsidies for South Western (new franchise: started in February 2007)**[10]

| YEAR | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Nominal**[11] **Payment** | £16.2 | £61.2 | £23.2 | (£36.5) | (£74.4) | (£117.4) | (£160.1) | (£193.9) | (£223.6) | (£250.4) | (£235.2) |
| **Payment at 2006/07 Prices** | £16.3 | £63.6 | £25.0 | (£40.7) | (£85.8) | (£140.0) | (£197.6) | (£247.9) | (£295.7) | (£342.8) | (£331.5) |

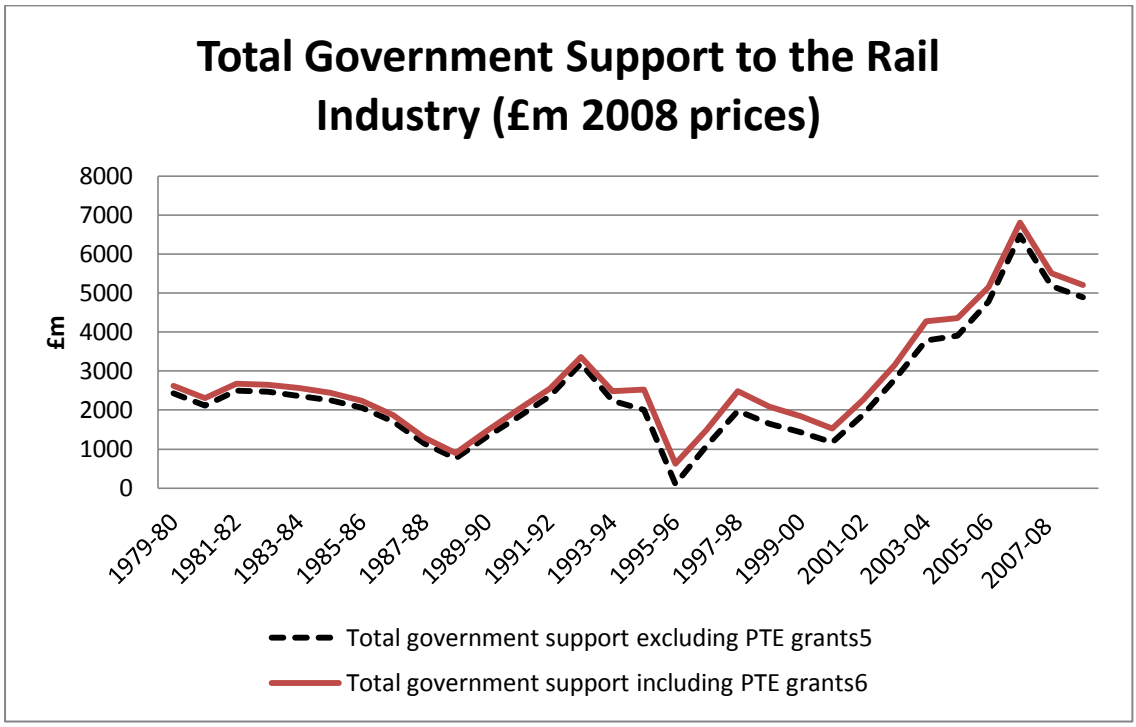
Source: (DfT, 2009a)

Government support to the rail industry was expected to fall after privatisation, especially as one of the main reasons for privatisation was to reduce the amount of Treasury spending. Figure 4-11 highlights the reverse in expected trend and shows an increase in Government expenditure in the railways in the respect of support in the form of grants and subsidies. The franchising process stimulated a drop in expenditure at the point of privatisation but since then, and in particular since the Hatfield crash, support has increased to levels far and above those seen prior to the privatisation process.

[10] Note: year 1 represents the partial year ending 31 March 2007; Year 11 represents the partial year ending 4 February 2017.

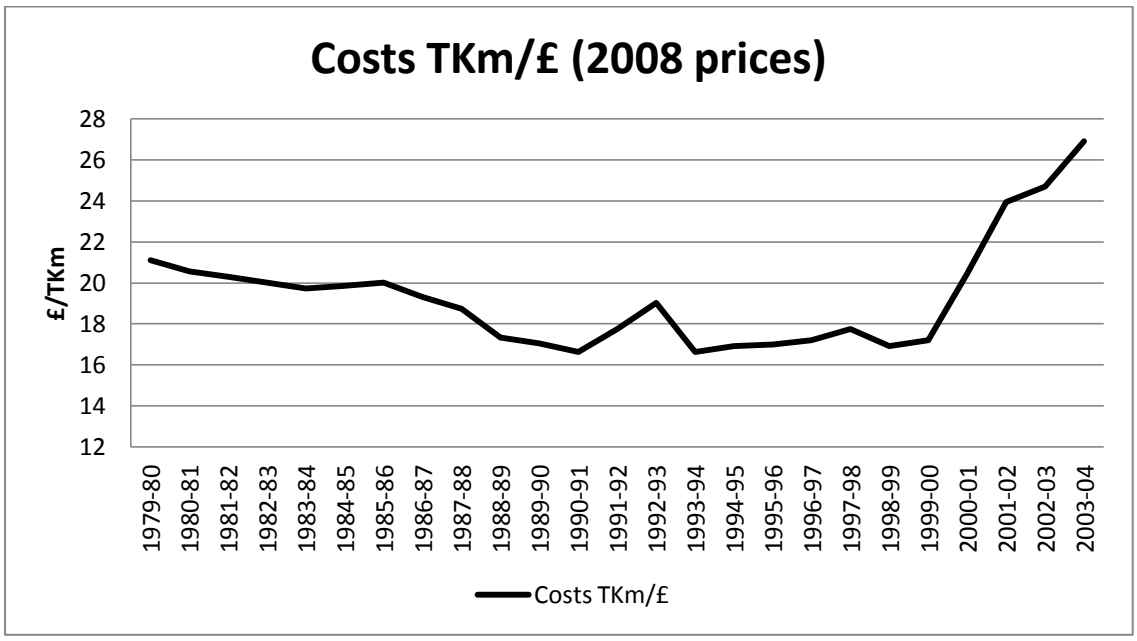
[11] The amounts show franchise payments year by year expressed in £m. Amounts in brackets are premium payments made to DfT by the franchisee; other amounts are subsidy payments made to the franchisee by DfT. The "Franchise payments in 200x/200x prices" show the amounts that appear in the Franchise Agreements; the nominal payments are the real figures adjusted for inflation.

**Figure 4-11 Total Government Support to the Rail Industry in Current (2008) Prices**




The total costs of running the railways per train kilometre (Figure 4-12) is taken from Andrew Smiths work on rail costs (Smith 2006 p 18 fig 1) and then converted to 2008 prices in line with all costings for this research. The data highlights the inordinate increase in costs from the Hatfield incident onwards. The majority of these costs were attributed to infrastructure investment (Smith 2006).

**Figure 4-12 Costs per Train Kilometre (2008 Prices)**




Source: Smith (2006)

Finance for UK rail infrastructure investment since the privatisation of the industry has seen many changes. Currently (since 2005), it is sourced through Network Rail (through a mixture of track access charges paid by the train operating companies (TOC's), and the Network Grant, paid directly by government to Network Rail (NR)), through the Passenger Transport Executives (PTE's) and through the Northern Ireland Integrated Transport Operator, both of which are dependent on levels of funding determined in the Comprehensive Spending Review (CSR). For Network Rail, the network grant accounts for approximately 82% of revenue in 2009/10;- this is scheduled to decrease to 72% over Control Period 4 (the regulatory period running from April 2009 to March 2014 (ORR, 2009a)). The Control Periods follow on from the original spending reviews set up by the Strategic Rail Authority (SRA) and are currently set at five year periods. The service needs of the Industry are stipulated in the High Level Output Specification (HLOS), which is decided by the government, and then supported by the Statement of Funds Available (SoFA).

Framing the HLOS and SoFA is the sole preserve of the Secretary of State. Determining the outputs that Network Rail has to deliver in contributing towards delivery of the HLOS (consistent with the SoFA), and the access charges that Network Rail will receive to fund the costs of these outputs, is the preserve of ORR. Network Rail has a right to reject ORR's final determination, if it believes that the outcome of the periodic review is unreasonable and the ORR can then either revise its determination or refer the matter to the Competition Commission. Overall there has been an increase of 83% (2008-09 prices) in 2009 spending compared to spending in 2000 (DfT, 2007a).

Table 4-4 gives the actual spends and % change since 2000 and highlights how spending peaked in 2004 with the acquisition of rolling stock being the main beneficiary. Spending on stations has been mainly cosmetic and general maintenance and apart from an increase in 2006 the spending on stations has always been less than that spent in 2000.

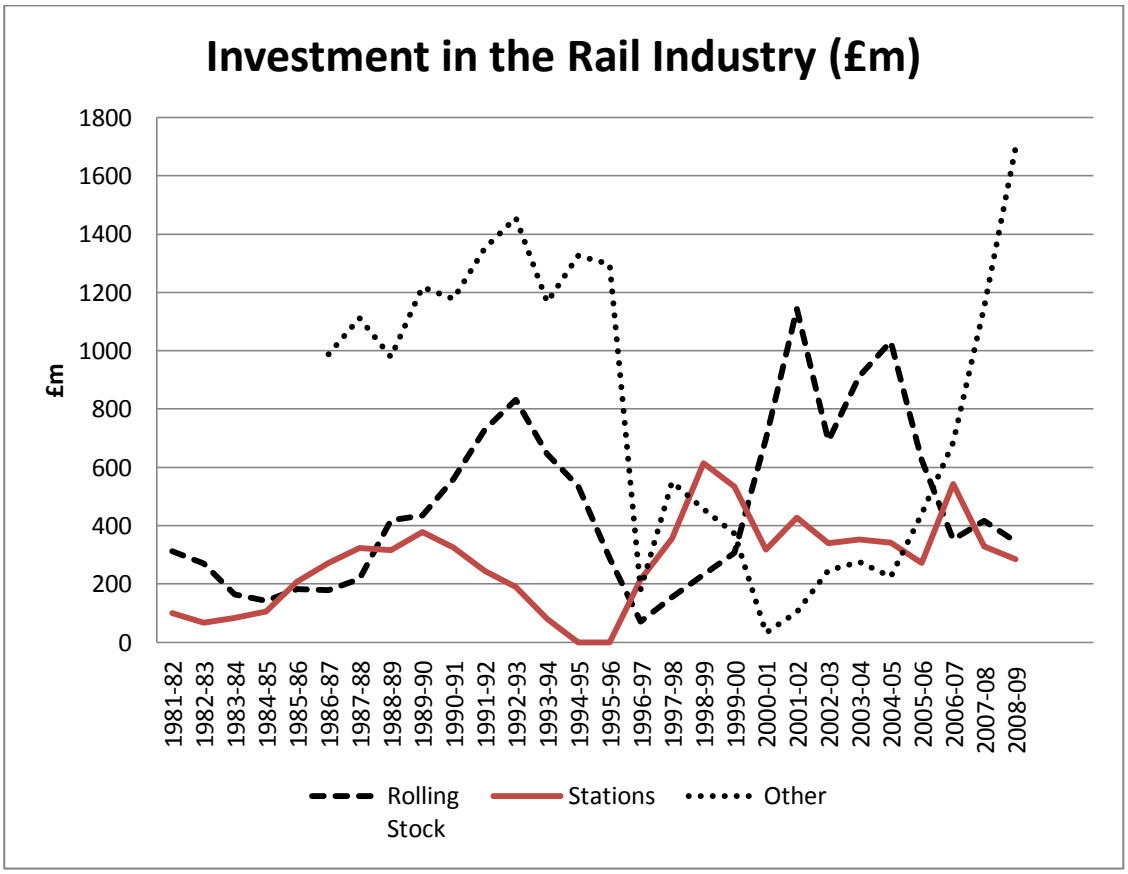
**Table 4-4 Investment since the Transport 2000 Plan**

| | Track and Signalling | % Change | Rolling Stock | % Change | Stations | % Change | Total investment | % Change | Tot Inv (08/09 price) | % Change |
|---|---|---|---|---|---|---|---|---|---|---|
| **1999-00** | 1,315 | 0 | 236 | 0 | 410 | 0 | 2,248 | 0 | 2,812 | 0 |
| **2000-01** | 2,126 | 61.67% | 554 | 134.6% | 253 | -38.39% | 2,958 | 31.58% | 3,630 | 29.07% |
| **2001-02** | 2,718 | 106.72% | 922 | 290.4% | 345 | -15.90% | 4,070 | 81.05% | 4,935 | 75.47% |
| **2002-03** | 3,275 | 149.05% | 566 | 139.8% | 279 | -32.09% | 4,322 | 92.26% | 5,087 | 80.89% |
| **2003-04** | 4,188 | 218.52% | 774 | 227.6% | 299 | -27.05% | 5,496 | 144.48% | 6,295 | 123.82% |
| **2004-05** | 3,051 | 132.06% | 897 | 279.6% | 297 | -27.74% | 4,440 | 97.51% | 4,937 | 75.55% |
| **2005-06** | 2,601 | 97.80% | 557 | 135.9% | 243 | -40.80% | 3,794 | 68.77% | 4,097 | 45.68% |
| **2006-07** | 2,629 | 99.90% | 326 | 37.95% | 503 | 22.57% | 4,092 | 82.03% | 4,233 | 50.50% |
| **2007-08** | 2,713 | 106.35% | 401 | 69.63% | 316 | -23.02% | 4,535 | 101.73% | 4,495 | 59.82% |
| **2008-09** | 2,823 | 114.68% | 346 | 46.30% | 285 | -30.68% | 5,149 | 129.05% | 5,169 | 83.78% |

Source DfT (2000)

Total spend since 1980 is disaggregated into ‘station’, ‘rolling stock’ and ‘other’, and Figure 4-13 shows the total amounts spent in each category. Investment during the privatisation transition period shows as negligible and is due to the sale and transfer of assets at this time (Gourvish, 2002a).

**Figure 4-13 Investment in the Rail Industry**



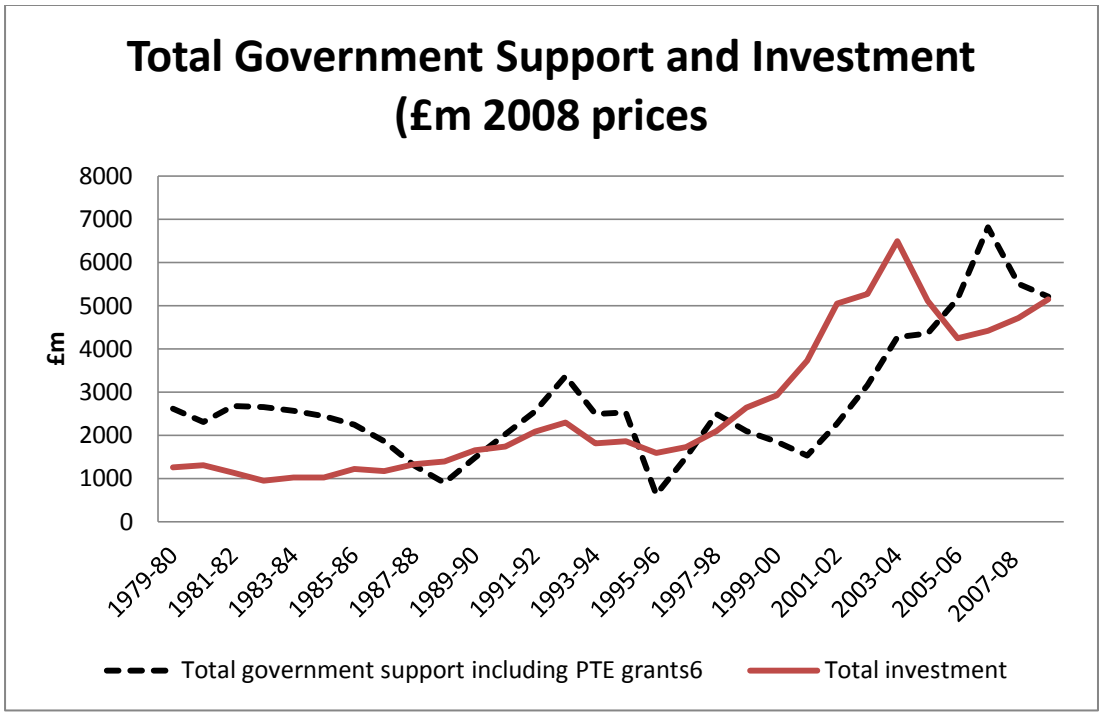

Although there were significant savings on operating costs in the first few years of privatisation (Pollitt and Smith, 2002), these abruptly came to an end with the Hatfield crash in October 2000. Maintenance and renewal were reappraised after the event and significant and sustained increases in funding were instigated. An important question arises from this increase: are post-Hatfield cost and productivity levels reasonable and should they be sustained? An important reason for the privatisation of the rail industry was the reduction in Treasury spending and the encouragement of competition in order to incite cost efficiency and high productivity. The increased costs of the railways have burdened the Treasury to levels unseen in the nationalised era. It has been argued that the need for increased funding is defensible as previous funding was inadequate, but in order to justify this increase it must first be found that

a) the inadequate funding requirements for infrastructure were directly responsible for the Hatfield Crash and
b) that the current levels of funding are comparable to other network infrastructure costs.

Both these scenarios are difficult to prove and open to critique. The main problem with the latter scenario is that there are no other directly comparable infrastructure networks to rail in the UK although as shown in the literature review chapter of this research there are attempts being made to address this issue. Many countries have privatised sections of their railways but, to date, no country has rolled out such a comprehensive and systematic privatisation initiative.

Figure 4-14 compares the trends in support and investment and highlights the significant increases in Government funding since privatisation, and more specifically, since the Hatfield crash in October 2000.

**Figure 4-14 Total Support and Investment since 1979 in £/m 2008 Prices**




A large proportion of the investment in the late 1980s is purported to have gone on the Channel Tunnel which opened in 1994, a year before the privatisation initiative (Gourvish 2002 p303). According to Gourvish, spending during this period was 'historically high', even without the investment into the tunnel. The difference is the system of an 'old' and 'new' railway which was agreed on for funding purposes whereby increased investment came with a reduction in revenue support. The total spend on the 'old' railway was still three times that which was spent on the Channel Tunnel from 1989-1994 (Gourvish 2002a). Table 4-5 shows the total spend on each sector and also gives total group spend.

**Table 4-5 Total Spend on the 'Old' & 'New' Railway in 2008 Prices**

| | 'Old' (existing railway) | 'New' (CT railway) | Group Spend |
|---|---|---|---|
| **1988/89** | 1104.66 | 9.18 | 1113.84 |
| **1989/90** | 1321.92 | 42.84 | 1364.76 |
| **1990/91** | 1329.57 | 272.34 | 1601.91 |
| **1991/92** | 1481.04 | 535.5 | 2016.54 |
| **1992/93** | 1461.15 | 797.13 | 2258.28 |
| **1993/94** | 994.5 | 787.95 | 1782.45 |
| **Totals** | 7694.37 | 2443.41 | 10137.78 |

Source: Gourvish 2002 Table 9.1 p304

Investment and support was also needed to implement the privatisation initiative. These costs have been wildly differentiated depending on what is considered a privatisation cost. The overall cost of implementation of OfQ was estimated at around £50m–£70m (Gourvish 2002), compared with some estimates of the costs of the privatisation process that are much higher (Harris and Godward, 1997). In 1993/94 (the last financial year before the reforms) the passenger TOCs received £0.55 billion in direct revenue subsidy, but there were also:

1. additional subsidies related to capital grants and grants towards the operation and maintenance of level crossings, which could amount to as much as £0.54 billion per annum;
2. changes in accounting conventions from current replacement cost of renewed assets to modern equivalent asset valuation of all assets, increasing the railway's capital costs by around 25%. This too may represent around £0.54 billion per annum. If the receipts of the privatisation sales are amortised over a 3-year period, they represent around £0.3 billion per annum (BRB, 1994).

These points explain most of the difference between the pre- and post-privatisation subsidy levels, although different studies draw different conclusions. Harris and Godward (1997) conclude that privatisation has led to a worsening of the railway's financial situation; however, White (1998) concludes the opposite (White, 1998). An unresolved issue is the size of the transitional costs (Preston et al., 2000).

Operator costs and profits are also pertinent to the cost of the privatisation initiative. Operator costs have risen, but so has income. Table 4-6 shows the TOCs' operating costs, pre-tax profits and government subsidies per passenger-km.

**Table 4-6 TOC's operating costs, pre-tax profits and government subsidies per passenger-km.**

| | 2000/1 | 2001/2 | 2002/3 | 2003/4 | 2004/5 | % change 2001–04 | % change 2001–05 |
|---|---|---|---|---|---|---|---|
| **Income (£m)** | 4,920.0 | 5,163.7 | 5,556.3 | 6,086.4 | 6,205.9 | | |
| **Average** | 196.8 | 206.5 | 222.2 | 234.1 | 248.2 | +19 | +26 |
| **Operating costs (£m)** | 4,792.5 | 4,977.3 | 5,271.7 | 5,768.0 | 5,868.5 | | |
| **Average** | 191.7 | 199.1 | 210.9 | 221.8 | 234.7 | +15.7 | +22.4 |
| **Pre-tax profits (£m)** | 92.5 | 183.1 | 293.4 | 412.6 | 345.4 | | |
| **Average** | 3.7 | 7.3 | 11.7 | 15.9 | 13.8 | +329.7 | +273 |
| **Subsidy (£m)** | 1,347.8 | 1,288.6 | 1,320.8 | 2,050 | 1,005.4 | | |
| **Average** | 3.4 | 3.3 | 3.3 | 5 | 2.4 | +47 | –29.4 |

Source: (Gourvish, 2008)

In the majority of cases income exceeded costs, but there are a few TOCs that have experienced large cost increases in relation to income, and others that have seen large rises in income compared with costs (Gourvish, 2008). Subsidies have now started to fall as many of the main operators have started to pay for their franchises. Indeed, TOCs are due to pay net premiums to the Department for Transport as the franchising authority in the near future (Reuters, 2009), and the majority of passenger train operations in Great Britain will be covering both infrastructure charges and operating costs by the end of the current Network Rail access charges control period (CP4) (DfT, 2008).

Rolling-stock leasing has involved some controversy. Set up with three ROSCOs, Angel Trains, Porterbrook and HSBC Rail, the aim was to provide choice to the TOCs and hence encourage competitive pricing. The Competition Commission recently looked at competition in the sector, and found that many TOCs were unable to choose which ROSCO to lease their trains from (Commission, 2007). A lack of available rolling stock pushed up prices and reduced choice, resulting in overcharging estimates of around £177m per year. Differences in the rail infrastructure with regard to electrification methods meant that choice of traction was limited and there were no guarantees of available stock at the beginning of a franchise period. Due to the varying lengths of the franchises investment into rolling stock became one of the largest costs to the TOCs (Preston, 1999a). However, the Competition Commission has concluded

that the major factor in the lack of competition in this market is the nature of franchising policy set by government, as opposed to the behaviour of ROSCOs per se.

Staff costs have risen above the level of inflation and TOCs have tackled this by reducing staffing in many areas from 135,000 jobs in 1993 to 43,000 in 1998 (Smith, 2006). Nationalised industries are reputedly over staffed in the main (Hood, 1994), but cutting two thirds of staff could have an impact on customer service and hence affect the benefits of privatisation. This scenario culminated in the failure of nine of the franchises according to Glaister (Glaister, 2002), as many franchises realised too late that they could not run the railways on the reduced staffing levels they had originally budgeted for in the franchise bids.

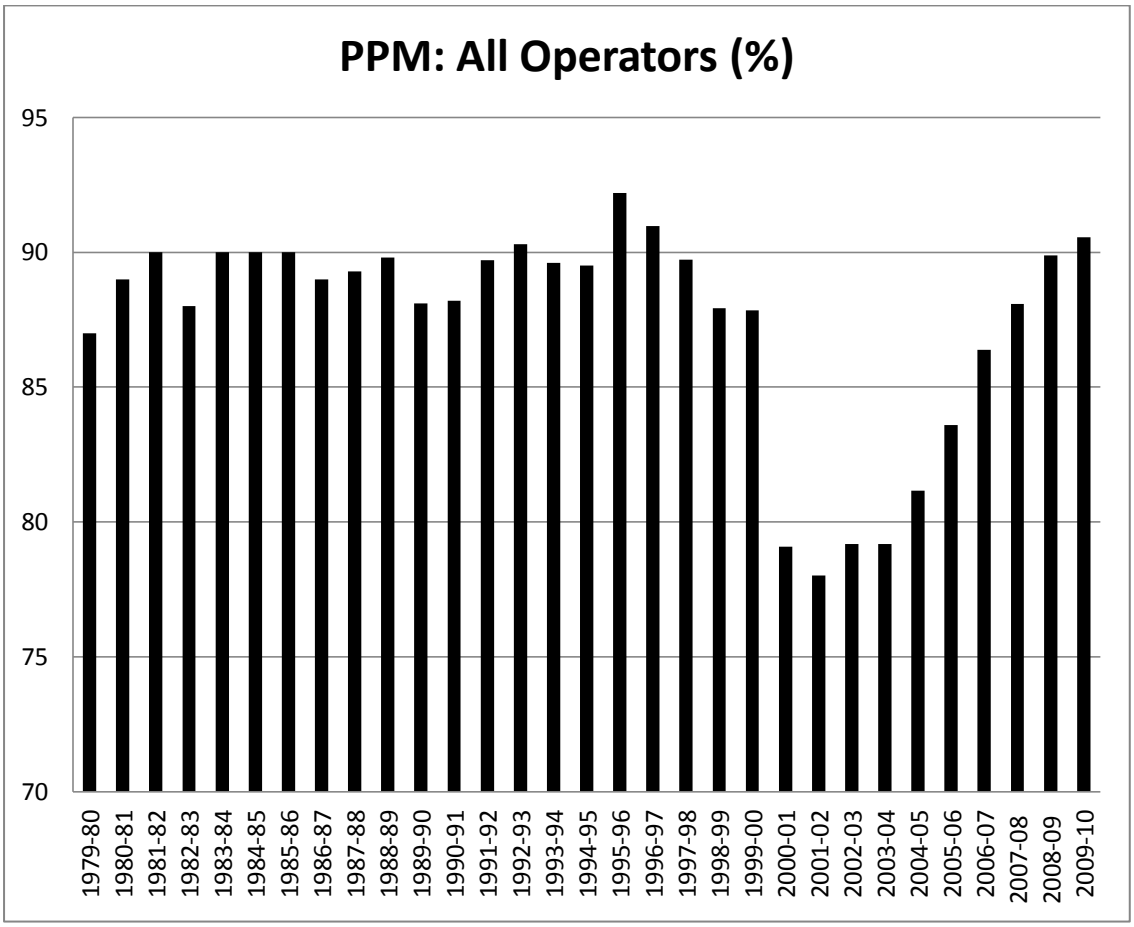
There are many impacts that affect the rail industry, not least those directly related as we have seen. The next sections look at external factors that could have an effect on the growth of the rail industry including other transport modes and other social and economic impacts.

### 4.3.6 Passenger Performance Measure

The Passenger Performance Measure (PPM) gives an indication of the quality and punctuality of the service provision. There are various problems with this data set and changes have been made to the collection rules to fill any loopholes that were apparent and exploited. One of these is the definition of 'Late'. The DfT has now clarified that any train that does not call at all of its prescribed stations is deemed as late (even if it arrives on time). Prior to this loophole being closed there were instances of trains missing out stations in order to arrive on time and therefore reach DfT targets, thereby enabling the collection of performance related payments. Cancelled trains are also recorded as 'Late' and the instances of cancellations has therefore dropped since it no longer makes sense to cancel a train in order to ensure it is not late (Kassam, 2006)! Trains arriving 'on time' are considered to be within 10 minutes either side of the time due for Long Distance trains and 5 minutes either side for all other trains (DfT, 2006). There are gaps in the data set: there is no disaggregated data prior to 1986 and there are no disaggregated figures for the two years that privatisation was rolled out, therefore it is difficult to use this variable in conjunction with other predictors for growth in PKm.

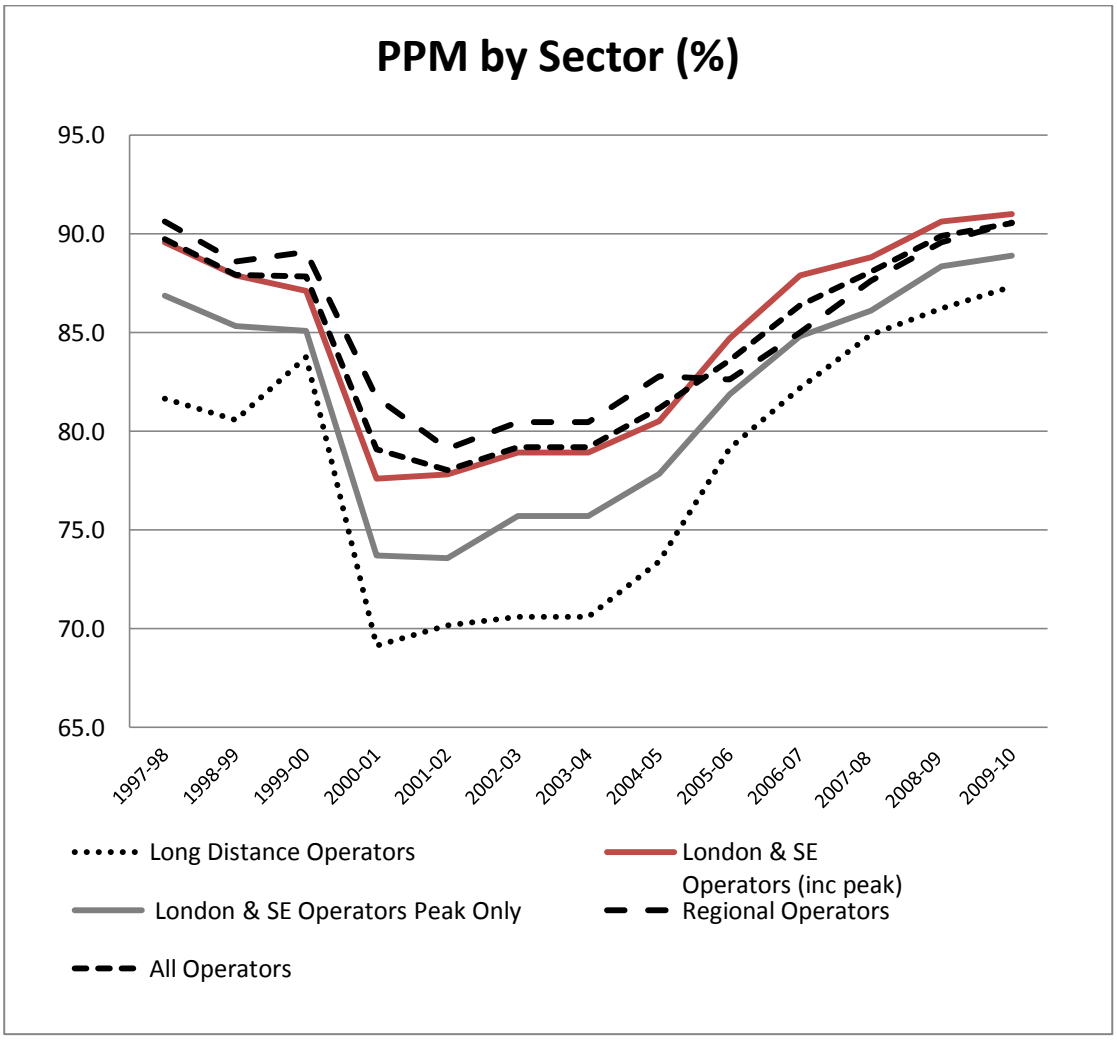
Figure 4-15 shows the general trend over the 30yr time period for punctuality. The Hatfield Crash of October 2000 had a big impact on the performance of trains for a considerable time after due to the speed restrictions that were placed on the industry.

**Figure 4-15 Public Performance Measure (PPM) for All Operators (%)**




Since privatisation it has been possible to disaggregate the data by Sector. Figure 4-16 shows how each sector was affected by the Hatfield Crash and the length of time it has taken each sector to recover.

**Figure 4-16 Public Performance Measure by Sector (Inc Peak and Off Peak for London & SE)**




The most severely affected sector seems to be the Long Distance Operators. It is this sector that made the most improvement in PPM prior to privatisation and also the first sector to recover after Hatfield. Although PPM is an indicator of performance it is not an easy indicator to use for contributing to growth in the industry due to the changes in collection methods and gaps in the data set. It would be useful instead, to look at a Hatfield variable that would account for the impact of this event on the growth in the PKm.

## 4.4 External Factors Affecting the Rail Industry

External factors that could have an impact on the growth in PKm are all interrelated - socially, economically, environmentally and politically. We have seen that the London & SE sector appears to be most affected by privatisation in the sense that it has seen the highest growth, with season ticket sales almost doubling. The privatisation period has also been a period of significant growth in the economy with one of the longest sustained year – on – year increases until 2008 and the current global recession. Unemployment has, in relative terms, been

consistently low during the privatisation period but prior to this the economy experienced a state of flux that is also apparent in the PKm. Political change has meant that policy has changed radically since privatisation with the Labour Government pursuing a policy of integration as opposed to the Conservative secular business model. The original aim of privatisation was very different under the Conservative Government and this issue is addressed in the next section.

### 4.4.1 Politics

Whereas the core objectives of the privatisation of water, gas, electricity and telecommunications were widely accepted by all the main political parties, those of rail were controversial. The Conservatives view of a subsidy free industry was different from Labour's 'integrated transport policy' with fundamental differences of interest between the SRA and ORR.

The objectives of the Conservative Government were to a) eliminate subsidy, b) use private borrowing for financing, and c) improve efficiency. The Conservatives did not have an integrated transport plan, but instead wanted to turn British Rail into a 'normal' set of businesses (Helm, 2000). The on-going fuel crisis of the early 1990s, congestion problems and the greater transport debate were peripheral to Conservative ideal. In order to achieve these objectives the privatisation plan was fairly well conceived. Competitive bidding would lessen the Treasury burden; an un-geared Railtrack balance sheet would provide the finance mechanism, and introducing competitive services over time would force attention onto costs and customer service, thus improving efficiency. But, due to the Labour threats of renationalisation (Haubrich, 2001, Newbery, 2002), the risk to franchise bidders increased and private investors into Railtrack were put off. Due to this increased risk, the regulator, after persuasion from the Government, moderated competition to ease the burden. Privatisation now became the objective rather than a vehicle of achieving the original objectives.

Performance post-privatisation, since the moderating of policy, was therefore both financially and organisationally dreadful. TOC's tried to reduce costs, usually staff costs, thereby affecting the service quality. Railtrack failed to tackle the fundamentals of managing a network and played scant regard to asset management and managing large projects. Furthermore, until recently challenged by the monopolies commission (2007), the ROSCO's proved very profitable and engineered the first 'railway millionaires' (Preston, 1999a). Actual costs were fixed to ensure Railtrack's revenue was secure; therefore the TOC's had very little room to

manoeuvre. The only way to substantially reduce costs was to drive down operating costs. Railtrack had a guaranteed income therefore profit was the difference between costs and income. Better service and more customers for the TOC's would mean increased costs to Railtrack; consequently poor service quality was not a problem for Railtrack. All this led to the inevitable climax which presented itself in October 2000 when the infrastructure failed at Hatfield causing a devastating impact on the industry.

Arguably, the Conservative model could have been made to work under different circumstances. Criticisms of the original privatisation structure are therefore unjustified when consideration is given to how other large industries followed the trend of downsizing and reorganisation through both vertical and horizontal disintegration (Flyvbjerg, 2007b). Monolithic companies have shown little evidence of improved interest in either customer service or efficiency (Hood, 1994). The main problems arguably arose when a change of Government meant a change of policy (Helm, 2000). The objectives of the incoming Labour Government were radically different from the outgoing Conservative Government (Goodwin, 1999). Therefore a new answer to the privatisation question was needed.

Labour had pledged to pull Railtrack back under public control. The White Paper (DfT, 1998), was an integrated transport policy that would also tackle pollution and congestion by encouraging users to switch from cars to buses and trains. The Conservatives had planned an efficient network but had not built into the equation the plans to enlarge the network. The Labour ideology would need extra financing to ensure that instead of a decline in services, they were increased to accommodate extra routes and increased capacity. The Labour idea was to use the Strategic Rail Authority, supported by the Integrated Transport Commission and the Rail Regulator, to steer this forward. The Rail Regulator would, in fact, become subordinate to the SRA, as reflected in the Transport Bill 2000 (Government, 2000). Politics has, therefore, played an enormous role in forming the parameters of what the possible outcomes of the privatisation initiative could be; not least the fact that it is politics that generated the initiative itself. As we have seen previously, despite the limitations of the initial rail privatisation scheme, PKm increased significantly after privatisation. Indeed, it almost seems that the growth in PKm is *despite* the political input rather than a product of it. This means that we need to look for other explanatory factors.

### 4.4.2 **Workforce and Employment**

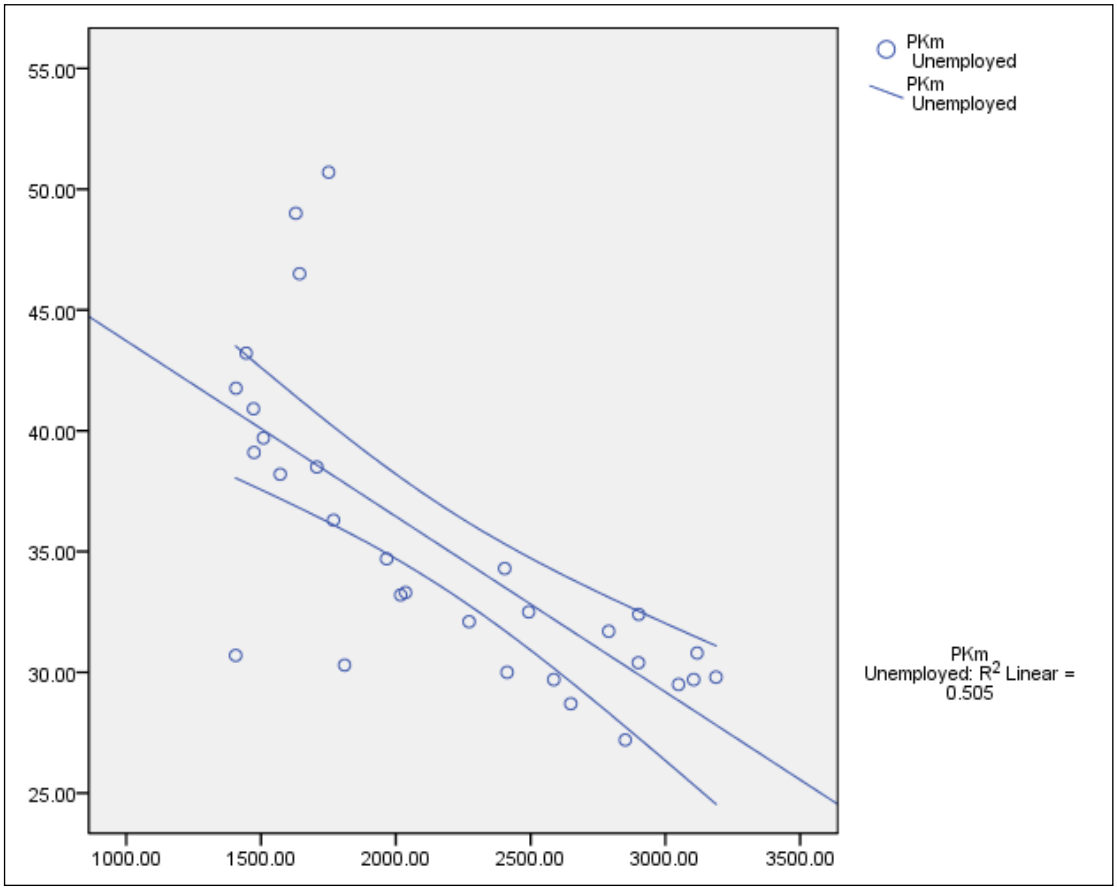
Employment has both a direct and indirect effect on the rail industry. First in the direct sense, British Rail used to be one of the biggest employers in the country. Network Rail currently

employs 35,000 people alone (Network Rail Profile 2009), and estimations by ATOC stand at around 130,000 staff employed within the industry at present[12]. The current recession and enforced efficiency savings of 21% by ORR on Network Rail has meant that recent reports outline a planned reduction in NR workforce of 1800 (Thompson, 2009), although Network Rail insist these are mainly from the West Coast upgrade that has now finished. Privatisation saw large staff reductions and streamlining of operations although reductions had already taken place during the previous decade, first in the 1980s 22% of the workforce was cut to try and save money (Gourvish, 2002a), and again when OfQ came into operation and 109,000 jobs were cut between 1990 and 1994 (Gourvish 2002). Staffing within the rail industry is clearly much lower now compared to its previous historical levels.

Secondly, from an indirect external perspective, employment rates impact on the rail industry through the number of commuters as well as a passengers' ability to pay. It is important that this indirect employment effect is accounted for when trying to work out the impact of different variables on PKm. The number of rail employees will affect the cost of rail whereas general employment will impact on PKm. By looking at the correlation between PKm and Unemployment it can be ascertained whether there is a significant relationship between the two variables and whether there is a case for using unemployment as a predictor for growth in PKm. Figure 4-17 shows the correlation between the two variables and highlights the negative impact that Unemployment has on PKm growth.

[12] This was given through written evidence to the Transport Select Committee in November 2009 and published on the TSC website.

**Figure 4-17 Correlation between Unemployed and PKm**




There is a distinct negative correlation between unemployment and PKm. The Adjusted $R^2$ shows that 48.7% of the changes in PKm can be explained by changes to Unemployment. For each unit increase in Unemployment the PKm will decrease by 0.007 units. The *t-test* is highly significant giving a probability of less than 0.001 that the observed values of 16.587 (Dependant PKm) and -5.342 (Predictor Unemployment) will occur if PKm were 0. The outliers represent recent growth in the rail industry against one of the worst recessions the country has seen for many years (Morris and O'Grady, 2009). Whereas PKm has previously fallen in recession years, it seems that passengers are, although reduced, now downgrading from first class to standard rather than abandoning rail travel entirely.

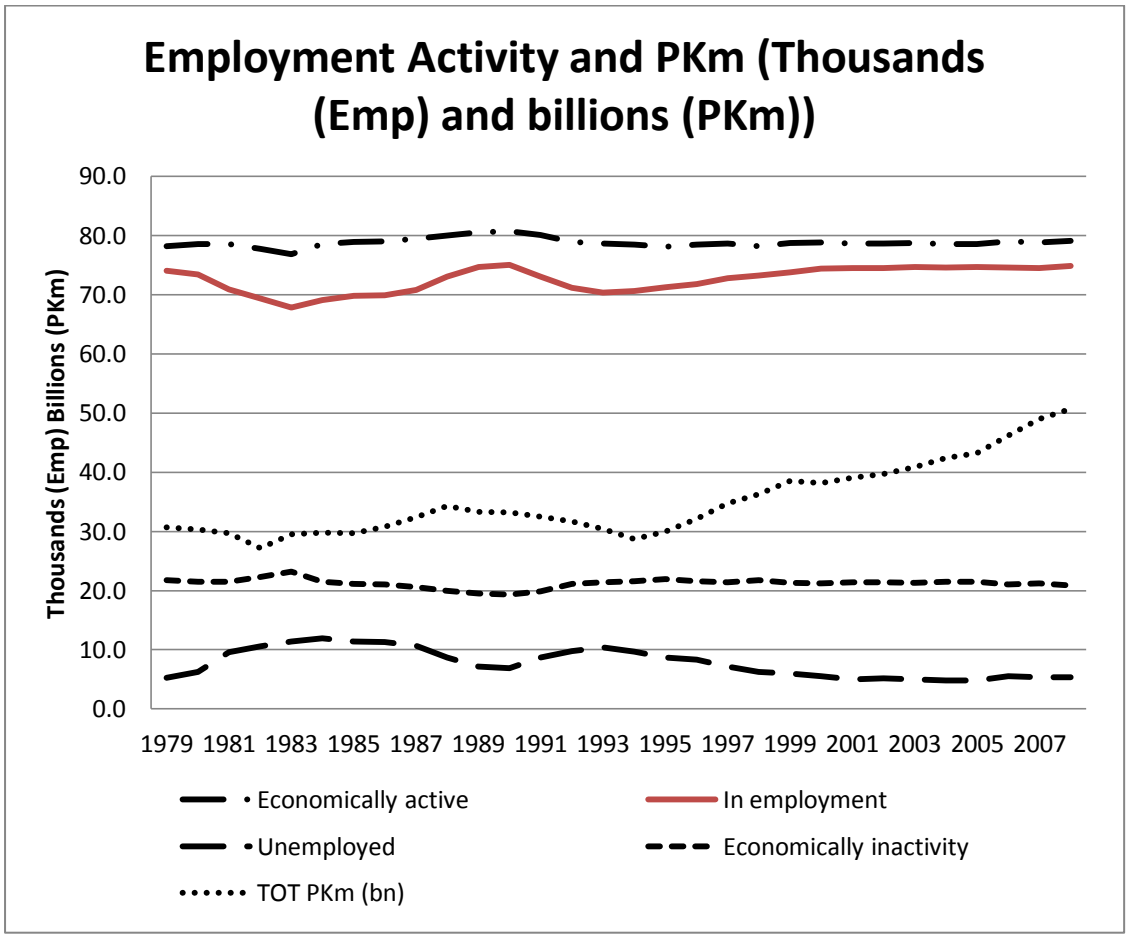
Although inversely related and highly significant, the unemployment of the population only indicates peoples' inability to travel, and therefore would be a better predictor of a decrease in PKm, rather than as a predictor of the enormous increase that has been observed.

Data is readily available for demographic indicators such as population, income, births/deaths, ethnicity and migration but using this data to help predict PKm is difficult with aggregate data. Localised population changes will impact specific routes: i.e. a main industry in a small town

closing would reduce the ability to spend of those now unemployed and also decrease commuter traffic, but the dilution of so many factors into the national network area would make it very difficult to analyse. GDP is one indicator that can be used as an indication of the spending power of the passenger base. Changes in the GDP affect the economy as a whole and can be used to gauge general increases and decreases in spending power.

We have seen that unemployment affects the PKm and Figure 4-18 shows that conversely, employment activity also impacts on PKm.

**Figure 4-18 Employment Activity and PKm**




The rise in employment during the late 1980s and early 1990s is also reflected in the PKm. Although the PKm follows the employment totals fairly closely, it breaks away and rises at a much faster rate after privatisation, suggesting that even though there is a correlation, there are other factors that affect PKm far more strongly. By carrying out a regression, using PKm as the dependant variable and Employment as the Independent variable, the adjusted $R^2$ shows an 81% likelihood that changes in the employment figures will affect the PKm, with both variables having a high significance. Employment would be a good indicator of changes in PKm

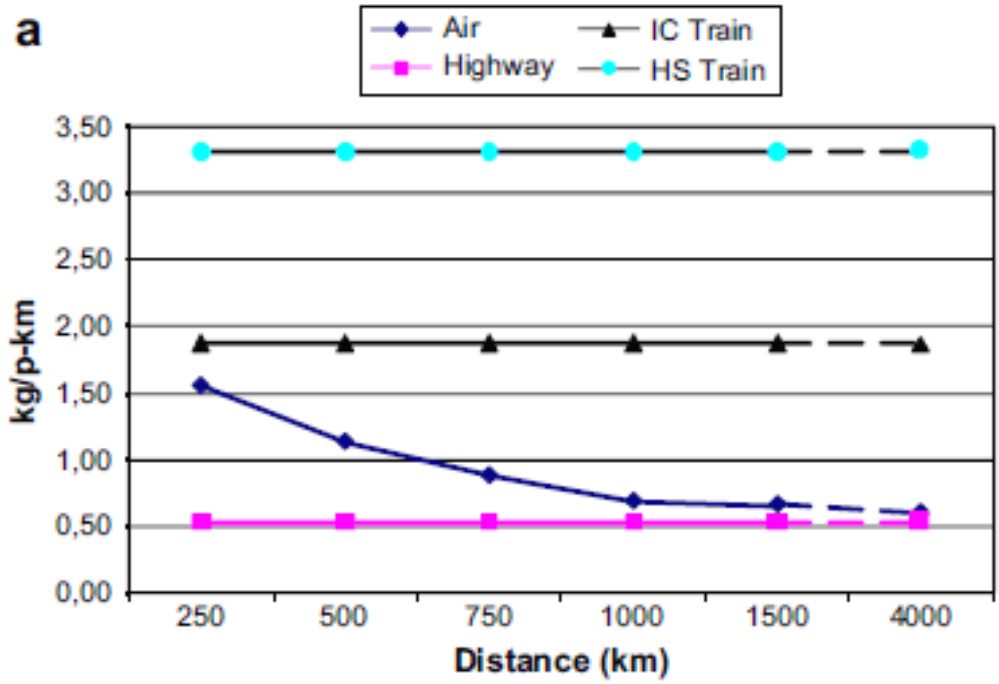
if the sector data were analysed. London and SE sector has the highest PKm rise and the most commuter services. We have seen from the previous section on rail trends that the regional sector and Long Distance sector do not have the same impacts.

### 4.4.3 Environmental Factors

Environmental factors affect the PKm but are not easily quantified. Recent research on the performance of six carbon footprint models (Kenny and Gray, 2009) highlight the lack of standards or codes of practice associated to calculating carbon footprints inevitably leading to significant differences and inconsistencies between these models (Kenny and Gray 2009 p2). The main problems appear to be the parameters that each model uses and their rationale. Technological advances can mean a difference in the materials used in transport infrastructure, vehicle manufacture and fuel source. All of these factors impact on the total carbon footprint for each mode of transport. The problem then arises that not only can the parameters be out of date but it is also difficult to account for transport infrastructure construction, vehicle type and average fuel consumption over such a large scale project such as attempted in this research. The margin of error for environmental impacts will increase the larger the area studied and if the parameters are less rigorous than it would be liked, the overall assessment is flawed.

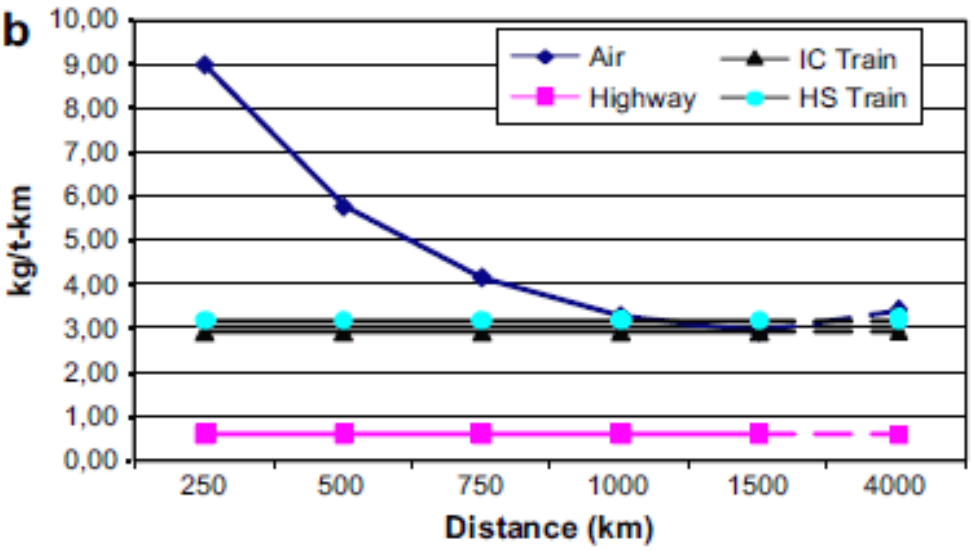
Research by Federici et.al. (2009) looked at the energy and environmental comparisons on different transport modes (Federici et al., 2009). The case studies centred on Italy using the parallel road and high speed rail link from Milan to Naples and the main Italian airports in Rome (Leonardo da Vinci and Ciampino). Figure 4-19 and Figure 4-20 highlight the differences of material input on PKm and vehicle Km.

**Figure 4-19 Comparison of material input per p-km for air, train and highway passenger transport.**[13]




Source: (Federici et al., 2009)

**Figure 4-20 Comparison of material input per t-km for air, train and highway freight transport**[14]




Source: (Federici et al., 2009)

[13] Air related MI (calculated under the assumption of 50% of maximum payload capacity) declines steadily with distance, due to the declining importance of infrastructure in such a transportation modality.

[14] Uses the same assumptions as (a).

Airplanes are always competitive with HS train and IC trains, when material intensity indicators are taken into account, due to the dominating influence of infrastructure. Aircraft only need an origin and destination whereas rail needs complete infrastructure from start to finish. Air related MI declines steadily with distance, due to the declining importance of infrastructure in such a transportation modality. Under the same assumptions used for (a), air transport is never competitive, while highway truck transport is always the less intensive option, as far as material intensity is concerned (Federici et al., 2009).

When energy inputs for each mode are compared the picture is very different. Rail performs much better for both vehicle Km and PKm. Air transport becomes competitive with High Speed after 1000km at 50% capacity but when capacity is increased to 80% for each mode, air transport starts to compete at around 500km. Due to the small freight payload of planes they are never able to compete with other modes at domestic level.

Different transport agencies conclude with differing assumptions as to the impact of transport on the environment. According to the Rail Freight Group during a recent Government Inquiry rail freight produces 70% less emissions than road freight and Eurostar have predicted that the reduction in journey times of HS1 has increased market share for rail and therefore reduced the overall $CO_2$ emissions as a result of higher load factors (TSC, 2009a). According to Crossrail Ltd. the construction phase of the project will produce approximately 80.660 tonnes pa. of $CO_2$ but this will be offset over the first few years due to a modal shift resulting in a net decrease in emissions of -1.314 tonnes pa. (Crossrail, 2007). Other, less rail orientated, agencies suggest that inadequate consideration is given to less costly and less intrusive transport improvements such as road widening, and that rail improvements such as HS2 encourages travel rather than relieves congestion thereby adding to the carbon output.

In summary, accounting for each variable specific to each transport mode and comparing over such a large area is not without its problems. Environmental impacts will be looked at further for the purpose of costs in the rail industry in the next chapter where the chosen impacts will be explored and accounted for in greater detail.

## 4.5 Other Transport Modes

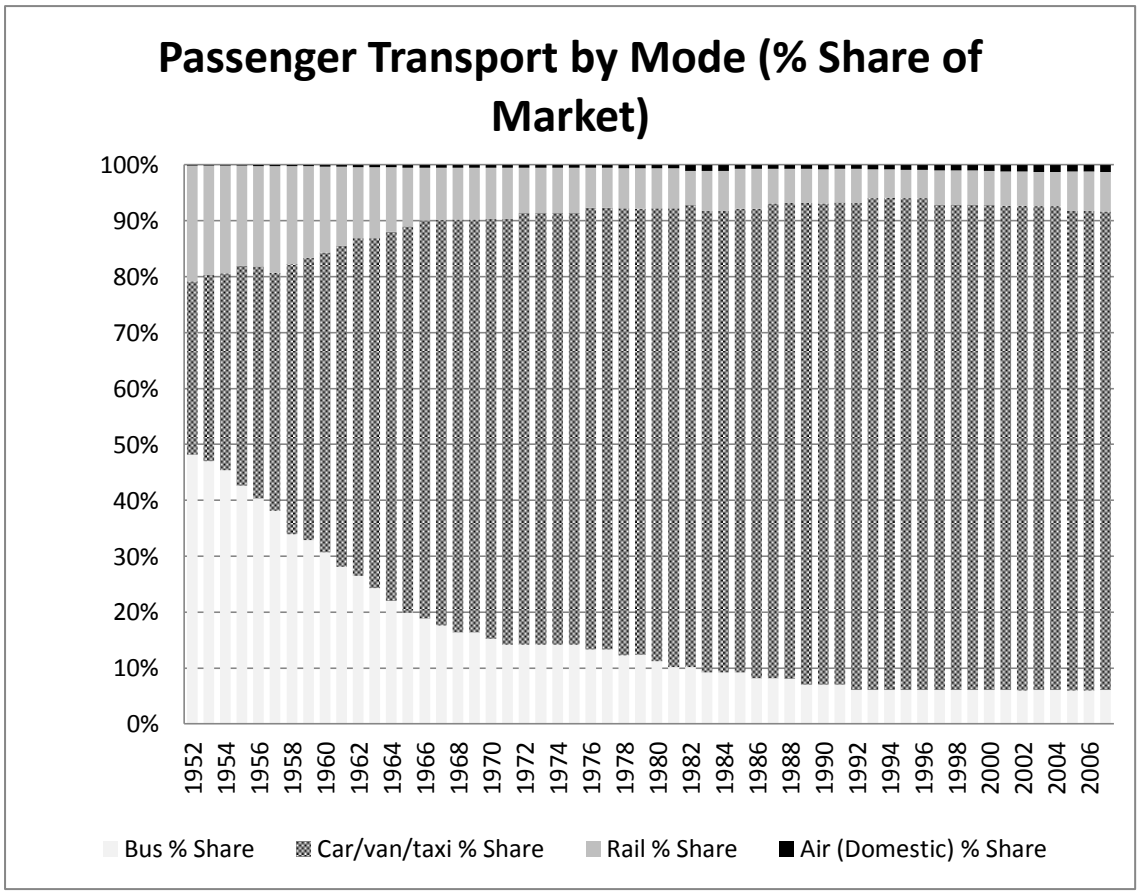
There have been significant changes in travel patterns over the last 50yrs. Technological and social developments have meant people have tended to travel further for work and leisure which has meant an increase in travel and choice of transport mode. Cheaper flights, increasing car ownership and a general increase in disposable income have changed the way

that people live their lives. This section looks at the impact that other transport modes have had on the rail industry and whether the privatisation of the rail industry has altered any trends.

### 4.5.1 General transport trends

Modal choice has changed considerably since 1950. Figure 4-21 highlights the change in the 1950s and 1960s from public transport to private transport. Car use and ownership has increased exponentially and brought with it a whole different set of problems for transport policy. Road building, widening, and enhancements coupled with recent fuel increases and capacity and congestion measures have shown stagnation in the growth of both ownership and use in the last couple of years.

**Figure 4-21 Percentage Share of the Market of each Transport Mode**

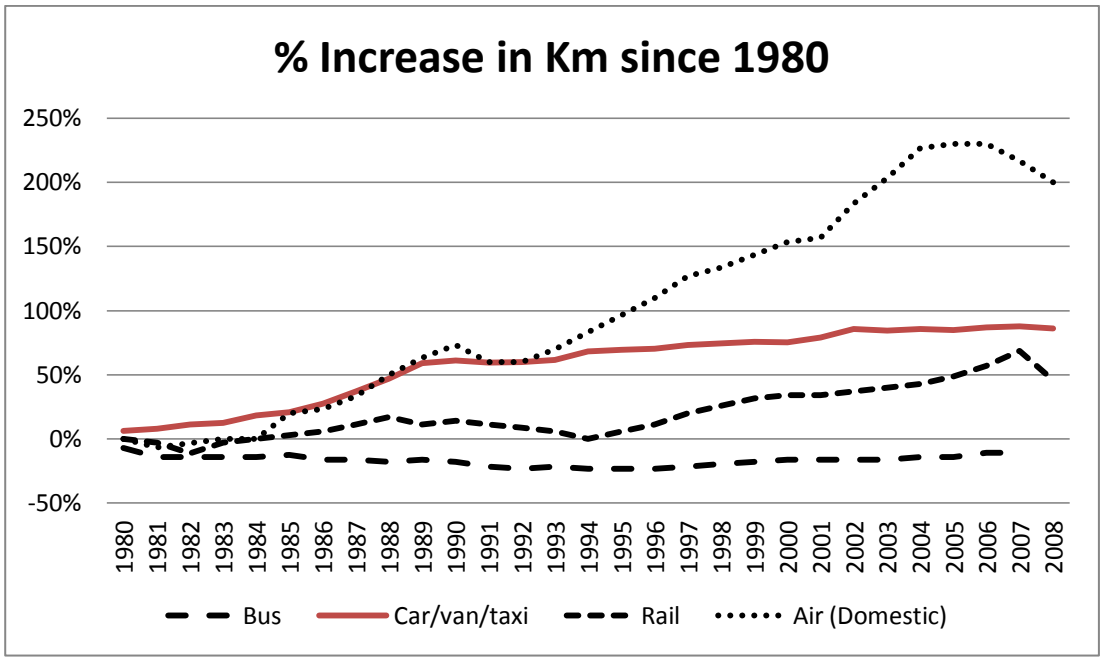



Source: (DfT, 2009c)

Although the graph is not representative of total growth in the specific transport modes it does give a good indication of how travel behaviour has changed over the years. Figure 4-22 shows how individual transport modes have changed since 1980. The rise in cheap air fares

has seen a large increase in PKm for domestic flights and rail travel shows a considerable rise since privatisation.

**Figure 4-22 Overall Percentage Growth of Transport Modes**




Car use appears to have peaked and the overall modal share and total PKm has reduced in recent years (see below). Table 4-7 highlights the reduction in young drivers since a peak in the 1990s. Although the average cost of running a car has reduced in real terms over the years, the cost of passing the driving test, high insurance costs (mainly for young men), coupled with rising fuel prices have helped to reduce the amount of young drivers (DfT, 2009b).

**Table 4-7 Percentage of Full Licence Holders by Age and Gender over Selective Years**

| **Males** | **17-20** | **21-29** |
|---|---|---|
| 1975/1976 | *36* | *78* |
| 1985/1986 | *37* | *73* |
| 1995/1997 | *50* | *80* |
| 2008 | *38* | *67* |
| **Females** | **17-20** | **21-29** |
| 1975/1976 | *20* | *43* |
| 1985/1986 | *29* | *54* |
| 1995/1997 | *36* | *67* |
| 2008 | *35* | *61* |

Source: DfT (2009) National Travel Survey 2009

Trends in car use appear to be changing from the consistently upward trend seen over the last few decades. Table 4-8 shows how the average number of trips and time spent travelling has

decreased since 2005. This is for all age groups and therefore highlights a general trend rather than one for a specific sector.

**Table 4-8 Average Car Trips and Time Spent Travelling**

| | **2005** | **2006** | **2007** | **2008** |
|---|---|---|---|---|
| Average Trips Made per Year (Car Driver) | 3,682 | 3,660 | 3,641 | 3,494 |
| Average Hours Spent Travelling | 151 | 149 | 147 | 143 |

Source: DfT (2009) National Travel Survey 2009

It is safe to assume that people are either travelling less or using a different mode of transport to make their journeys. The additional growth that has been seen in the rail industry since 2005 could include some of the trips that would have previously been made by car. According to the DfT National Travel Survey (DfT, 2009b), we are making less and shorter trips but taking longer to get there (Table 4-9).

**Table 4-9 Overall Journey Length, Distance, Frequency and Duration of Trips for all Modes of Transport**

| **Trip Duration** | 1995/ 1997 | 1998/ 2000 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|
| Commuting | 24 | 25 | 26 | 26 | 27 | 27 | 27 | 28 | 28 |
| Business | 36 | 38 | 37 | 40 | 40 | 38 | 38 | 42 | 41 |
| Education | 18 | 19 | 21 | 21 | 20 | 20 | 21 | 21 | 22 |
| **Trip Length** | | | | | | | | | |
| Commuting | 8.2 | 8.3 | 8.5 | 8.5 | 8.5 | 8.7 | 8.7 | 8.9 | 8.6 |
| Business | 19.0 | 19.9 | 20.2 | 21.0 | 21.1 | 19.4 | 19.4 | 21.0 | 20.8 |
| Education | 2.9 | 3.0 | 3.2 | 3.1 | 3.2 | 3.2 | 3.3 | 3.4 | 3.3 |
| **Ave Yearly Distance** | | | | | | | | | |
| Commuting | 1,425 | 1,444 | 1,389 | 1,407 | 1,428 | 1,391 | 1,391 | 1,435 | 1,340 |
| Business | 730 | 718 | 693 | 707 | 726 | 723 | 682 | 700 | 630 |
| Education | 193 | 207 | 211 | 220 | 208 | 211 | 205 | 210 | 207 |
| **Ave Trips per Person** | | | | | | | | | |
| Commuting | 174 | 173 | 163 | 166 | 168 | 161 | 160 | 162 | 156 |
| Business | 38 | 36 | 34 | 34 | 34 | 37 | 35 | 33 | 30 |
| Education | 68 | 70 | 65 | 70 | 66 | 66 | 62 | 63 | 62 |

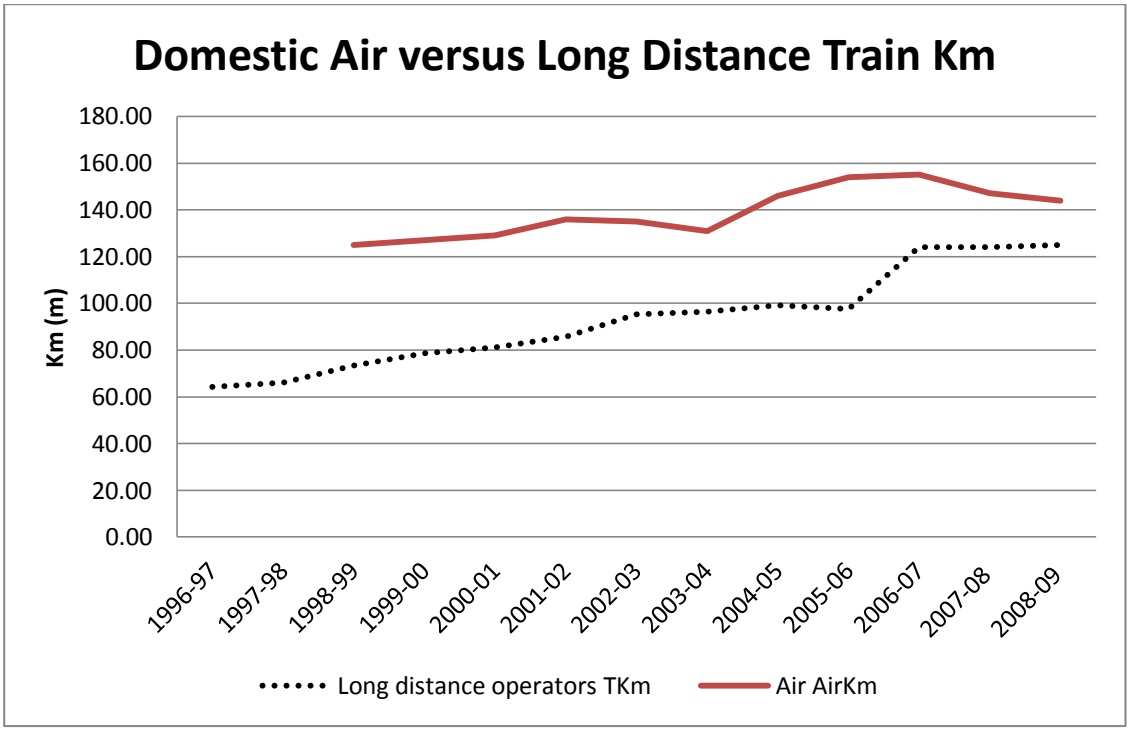
Source: DfT (2009) National Travel Survey 2009

This phenomenon highlights the significant problems with road congestion and capacity constraints of an increasingly densely populated nation.

### 4.5.2 Domestic Flights

Although Domestic flights have seen a huge increase, in terms of percentage rise since 1980, their overall share of the market is minimal. When the Long Distance Rail Sector is compared to Domestic Air there are similarities of size and comparisons can be made. The following section explores these two mode sectors to find if there is evidence of a correlation between increases in patronage. Figure 4-23 highlights the Km that each mode has travelled each year since 1996.

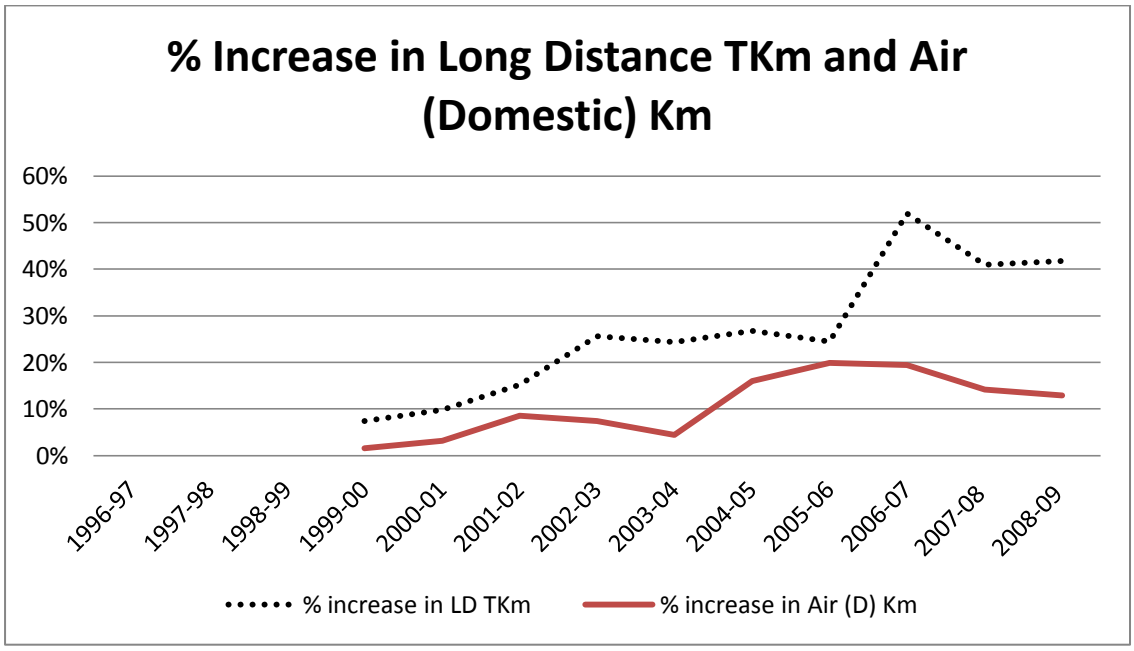
**Figure 4-23 Domestic Air and Long Distance TKm**




Source: National Statistics 2010

Rail has stabilised whereas air has started to fall. The domestic flight sector has seen a series of casualties in the low-cost companies as the recession has taken hold. Choice of airports has increased over the decade and air transport has opened up to many areas of the country yet despite falling prices and increased opportunity, it appears that rail has held strong. When you consider the percentage increase in vehicle Km across each sector (Figure 4-24), rail once again appears to have the highest increase.

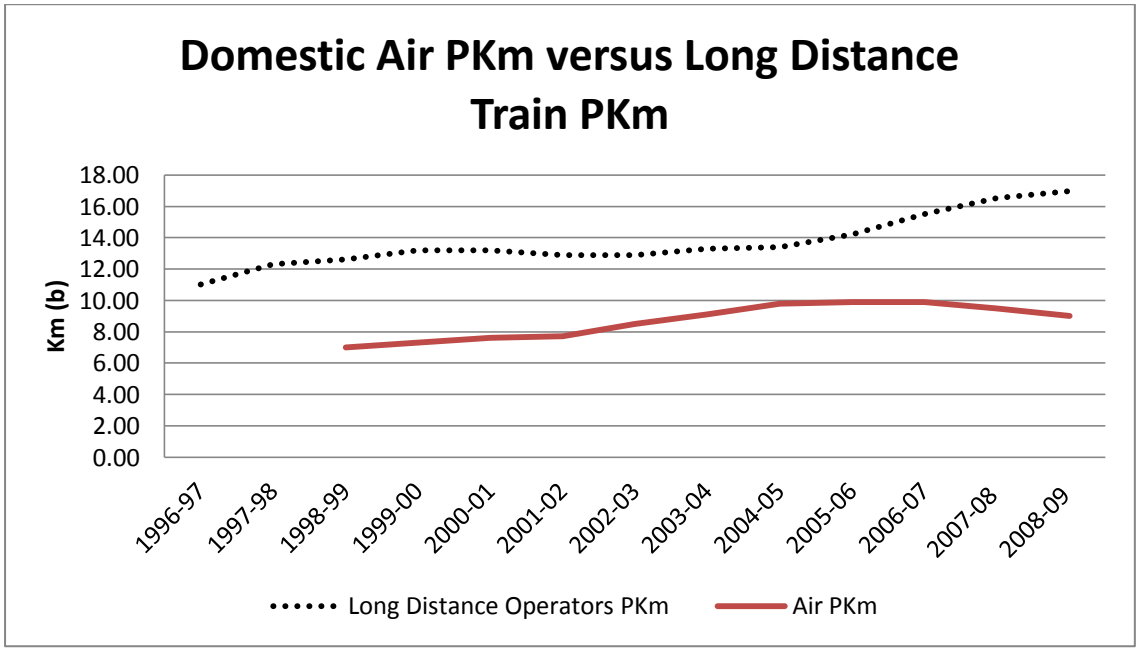
**Figure 4-24 Percentage Increase in Domestic Air and Long Distance TKm**




Source: National Statistics 2010

Passenger Km appear to have fallen in the domestic air market since 2005 (Figure 4-25) whereas PKm for the Long Distance Rail sector has continued to increase. As with the overall TKm in the previous section, it is necessary to also look at the amount of journeys that are taken to understand whether more passengers are travelling or longer journeys (or indeed empty transport modes) are occurring.

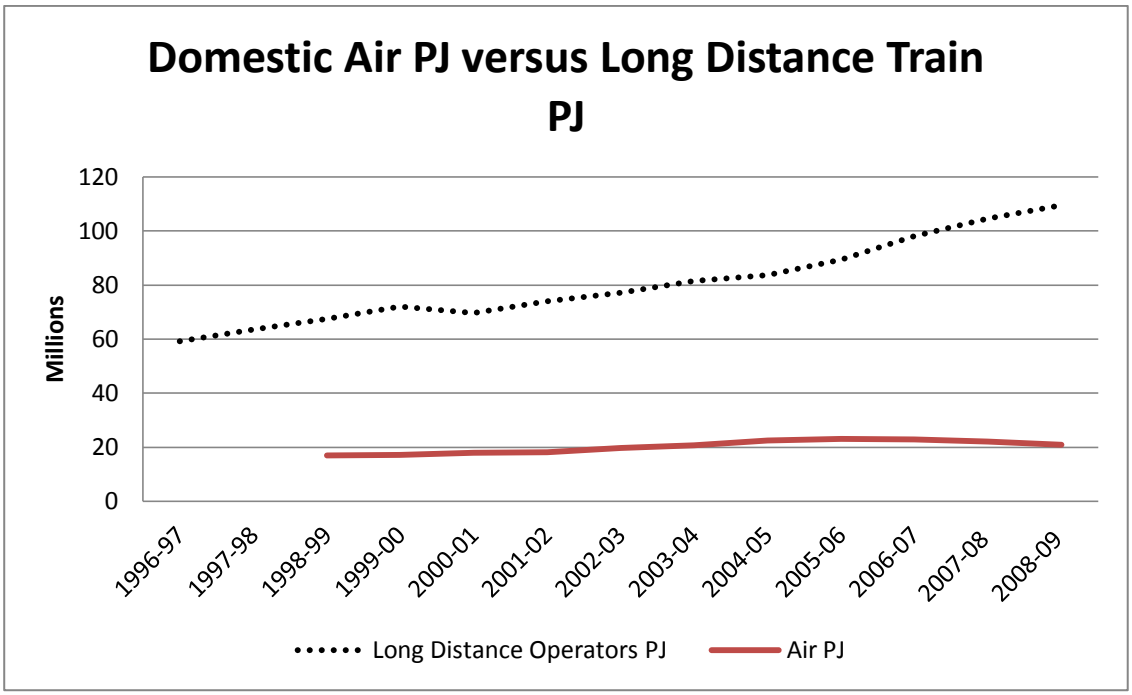
**Figure 4-25 Trends in PKm for Domestic Air and Long Distance Rail**




Source: Based on National Statistics 2010

Figure 4-26 shows that the increase in passenger journeys has mainly been in the rail industry and domestic flights have seen a relatively small increase until falling off in 2005.

**Figure 4-26 Trends in Passenger Journeys for Domestic Air and Long Distance Rail**




Source: Based on National Statistics 2010

The results of the trend analysis clearly show that Rail has proven to be a consistent competitor in the long distance domestic transport market. Airport security and lengthy waiting times may also be a factor in choosing rail over air as concern after the 9/11 terrorist attacks and subsequent security scares at airports across the world have caused distrust and fear of air travel. Air travel also needs an element of multi modal methodology due to the positioning of airports and the need for passengers to travel to and from airports to their final destinations. Airports tend to be sited out of town whereas rail stations are usually close to town centres. Cost of transport to and from airports can be a prohibitive factor if cheaper public transport alternatives are not freely available. Car parking costs are at a premium at airports and increases in fuel prices have seen taxi fares soar. Actual flying time may be considerably less than rail travel time but the logistics and multi modal necessities can ensure the total travelling time compares less favourably than rail.

### 4.5.3 Bus Industry

The Bus industry has seen the largest fall in modal share and it appears that deregulation had little impact on reversing this. Operator and Government attempts to encourage bus use have

included concessionary travel for the retired age group and increased fuel and rural subsidies but these have had little effect and although stabilised, little growth is apparent except in the London area. Table 4-10 shows the changes in bus ridership per head of population and underlines the dominance of London over all other areas.

**Table 4-10 Bus Ridership Percentage Increase per Head of Population, by Area**

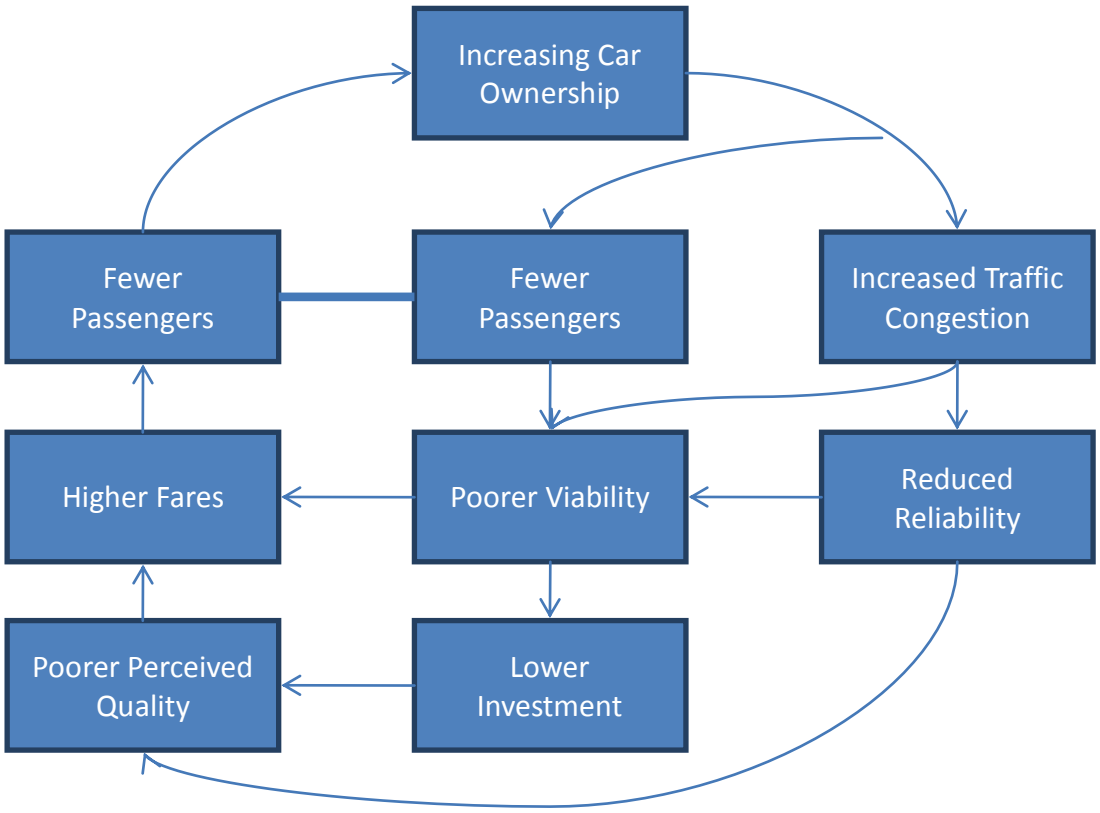
| Year | London | PTE's | English Shires | Scotland | Wales | All Exc London | Great Britain |
|---|---|---|---|---|---|---|---|
| **1995/96 – 2007** | 55% | -17.4% | -11.4% | -5% | -13.2% | -14.8% | 4.2% |
| **2001/02 – 2007** | 33.8% | -7.3% | -2.8% | 2.4% | 7.9% | -4% | 8.7% |
| **2005/06 - 2007** | 5.2% | -0.5% | 4.7% | 0.6% | 0.4% | 1.8% | 3.2% |

Source: Bus Monitor 2007

It is important to note that the PTEs are the only areas to have seen continual reduction in ridership. When compared to the rest of the English regions it becomes apparent that the actual number of passengers in the North and West (where the main PTE areas are) is more than double that of the South and Southeast, and any increases in ridership in the South will have a larger overall impact on the percentage increase. Why there has been a decrease in ridership in the North is subject to various impacts that have occurred.

Subsidy, before deregulation in the 1980s, was higher in the North than any other area and this has resulted in higher fare increases. The recession of the 1990s hit harder, and recovery took longer, than in other English regions and general increases in car ownership have also had an impact. PTE budgets have been continually cut and local authority contributions have decreased in line with reductions in passenger numbers. Road congestion has also played a part in the general decline in bus use. Rail has dedicated infrastructure that, although suffers from capacity issues, increases the chance of punctuality. Buses have to share the road infrastructure with cars and lorries and increased car ownership and road freight has meant congestion on the main roads and town centres has become substantially worse. The bus industry's cycle of decline can be best presented by Figure 4-27.

**Figure 4-27 The Bus Industry's Cycle of Decline**




Source: Bus Industry Monitor 2007 p26

One aspect of bus use that has seen improvements has been in the integration with other transport modes. Integrated transport was one of the key policies of the Labour Governments manifesto in 1996, but the original Rail Privatisation initiative was designed as a set of separate commercial concerns, not with integration in mind. Yet, integrating ticketing for different modes of transport is now seen as a necessary progression to enhancing customer service, passenger growth, environmental action and revenue increases, with franchises offering different incentives depending on the location and infrastructure of the area. This does not come without difficulty and due to the horizontal separation of the passenger services any technology innovations must be commercially viable and collectively agreed for it to be viable (Lovell et al., 2011). This has seen increased research into the uptake of technology advancements and although improvements have been seen, there is a question over full integration being an 'impossible dream' (Lovell et al., 2011).

Arguably the London Travelcard Area has been the main example of integrating bus and rail services with other modes of transport. However, such modal integration has spread to the extension of this to other smaller scale initiatives which has given passengers more choice and

easier route planning. This coupled with enhanced ticket buying options seems to have benefited customers on both cost and choice enabling detailed journey plans to be produced and downloaded in a variety of formats. There are many examples of current TOC initiatives on offer, some of which include: Bus/rail tickets, large car parks at parkway stations, Airport links, joint Rail-Ferry tickets and improved cycle carrying and storage facilities.

With many of the integrated transport initiatives now on offer customers can use one ticket to complete their journey. A specific example of modal integration is Stagecoach's bus and rail integration in Sussex. From July 2009, Stagecoach altered the timetable of the 711 bus to Rye to coordinate with rail links, thus reducing door to door journey times[15]. Buses tend to have more flexibility with timetables than rail (which is restricted by franchise specifications and infrastructure constraints). Thus operators with overlapping bus and rail services, such as Stagecoach in this instance, have incentives to coordinate them. Through train/bus ticketing is now available at all main stations irrespective of train provider or bus provider. Sales of PlusBus integrated rail and bus tickets across the First Great Western network more than trebled during 2005: in January, around 700 PlusBus tickets were sold compared to 2,200 in November[16].

The integration of transport has also seen more operators owning rail franchises and bus operations in the same areas. This may have benefits for passengers using multi-modal transport links but has also raised concern over monopoly's forming. This has been shown in the recent sale of Stagecoach's bus operations in Preston[17] after a ruling from the monopoly commission and also the referral to the commission of Stagecoach's operations in Eastbourne in 2009. One of the main reasons for the deregulation of buses and privatisation of the rail industry was to incite competition in the industries, yet mergers and acquisitions are frequent, and it could be argued that these local monopolies can produce an increase in quality and value that competition, by its very nature, hinders.

It is not clear if bus travel should be directly compared to rail travel due to the differences in route length, cost and origin/destination. Buses tend to operate around main towns whereas rail is limited to specific stations. Buses tend to be for short journeys of 1-3 miles, whereas rail journeys are usually for much longer distances. Where comparisons can be made are where

[15] southernrailway.com/stakeholders/17june2008
[16] firstgreatwestern/news/16Dec 2005
[17] Sold for £3.sm 25th Jan 2011 (BBC News - www.bbc.co.uk/news/uk-scotland-scotland-business-12275000

rail alternatives have been instigated. Integration comes in many forms and the rise in Bus Rapid Transit (BRT), light rail and trams in many metropolitan areas has had a variety of costs and benefits to both the local bus and railway services. BRT is a dedicated bus line that has fewer stopping points and a direct route – usually on a dedicated bus lane – to a main industrial area or airport. The benefits of BRT are speed, lack of (or reduction in) congestion, frequency and reliability, and origin/destination points. Cost of implementation is much smaller than light rail or trams and maintenance costs are also minimal. The cost to the rail industry can be quite high though as seen in the Manchester area where BRT, light rail and trams have all helped to ease the capacity problems on the railways but at the cost of improvement works to the rail infrastructure (TSC, 2009a).

## 4.6 Conclusion

The data available for rail is considerable but can also be limited in its usefulness. Taken individually the trends in rail can be seen to show a distinct rise in both patronage and quality. More passengers are now travelling than at any time in rail history and the reliability and quality of service have improved considerably. That said, the cost of providing the service appears to have risen exponentially when compared to the amount of service that is provided and reduction in employees providing the service. Utilising some of the rail data for the analysis of passenger kilometre increases may be difficult due to the collection methodology changes that have taken place. The essential data variables of passenger km, train km and revenue will be utilised in the next chapters and manipulated using a simple regression model.

The other trends that have been identified in this chapter have shown some interesting points that are worth commenting on. Domestic air is usually only comparable to HST but the rise in long distance rail in the UK has run counter to the fall in domestic air travel. The security, cost and quality of domestic air travel have all been raised as potential impacts on this decrease in patronage and this has been highlighted in the amount of low-cost airlines that have recently left the marketplace. The drop in car use and increase in congestion have also helped the long distance rail market to flourish. Fuel increases and high insurance costs have helped to keep car use to a minimum and the advent of cheaper advance rail tickets and integrated transport for total journeys have possibly contributed to the appeal of rail.

There are distinct correlations between the demography and economic climate and the rail patronage that have been identified. What does appear to be slightly different though is that

Rail, contrary to previous recessions, have been able to maintain patronage as passengers have moved from 1st class to ordinary class seating.

The trends identified here will provide the background and possible explanations for the change in passenger kilometres that will be analysed in the next chapter.

# 5 The Impact of Privatisation on the Rail Industry

## 5.1 Introduction

The previous chapter highlighted the overall growth in the rail industry since privatisation and the general transport and economic trends of the time period. Passenger kilometres have increased by around 70% (Wardman, 2006, Gourvish, 2002a, Gourvish, 2008), punctuality and customer satisfaction has improved (ORR, 2008b), and the amount of available train kilometres has increased. This general uplift in service provision begs the question *'how much of this growth is due to privatisation?'* The aim of this chapter is to try and explain the growth by looking at the different variables that contribute to explaining the trends in the rail industry (as identified in the previous chapter) and then to separate them in order to disaggregate the privatisation effect. These research aims are realised by looking at both possible and actual scenarios for rail development and measuring the difference in the results. The first scenario is the *actual*: what has happened since privatisation. The second scenario looks at the *counterfactual*: what could have happened if privatisation had not occurred, and the third scenario looks at what the industry expected to happen once privatisation was initiated – the *privatisation forecast*. From this point forward the three scenarios will be referred to as:

1. Actual (Ac) - i.e. AcPKm, AcRev. Recorded data that actually occurred.
2. Counterfactual (Cf) – Estimated variables for a rail industry without privatisation, i.e. CfPKm
3. Privatisation Forecast (Pf) – The expected effect of privatisation on the industry, i.e. PfPKm

The main reason for utilising a three scenario model is to separate the impacts of privatisation from any changes due to other reasons. It would not be fair to assume that all changes in demand are a direct result of the policy change and there would have to be some general trend that would have occurred regardless of the change in ownership or management. Therefore, in order to carry out the aims of this research a model has to be developed that can explain the impacts on passenger kilometres and attribute them to the policy initiative.

The chosen model is based on a simple regression analysis model where independent variables are tested against a dependant variable; in this case PKm; to see how much of an impact any changes in the independent variables would have on the dependent. The inclusion of a privatisation variable allows the impact of privatisation to be measured and separated

from other impacts. Once a model is formulated it can be tested to see what the impact will be using the Coefficient B statistic generated by the regression analysis. This statistic can then be used to forecast and predict changes in the PKm and can be used to develop both a counterfactual and predicted privatised scenario.

How this model was developed and the choices that were made make up a considerable part of this chapter. The first section explains the variables that were used in the analysis and the reasons for choosing them. The availability, aggregation and ability to be used as a comparison were discussed in the previous chapter where the groundwork was laid for this part of the analysis. The development of each scenario is then taken in turn before the final section explains the differences in the calculations and finds the consumer surplus in Passenger Kilometres that can be attributed to the privatisation of the industry. The second analysis chapter adds in the costs and describes the methodology for carrying out a Cost Benefit Analysis (CBA). This allows the cost of the privatisation initiative to be disaggregated to specific stakeholders and it can be seen where the benefit and disbenefit has been felt.

## 5.2 Explanatory Variables

The first stage of the process of deciding how much privatisation has impacted on passenger kilometres is to choose which variables to use in developing the model for the analysis. The aim is to find the privatisation effect: how much of the growth in Passenger Kilometres (PKm) can be attributed to privatisation. To achieve this, the PKm must be measured against specific variables that impact on the amount of kilometres travelled: cost, availability, and need/demand. There are various factors that hinder this process of evaluation including the availability of data, continuity of methods of data collection, and similarity of variables. As it became apparent in the analysis of trends there is a considerable difference in how data is collected across modes and also industries. Compounded by the problems of inconsistent data within the rail industry itself this has made the collection of data for the analysis difficult, but not impossible. The previous chapter highlighted the variables that were relevant and also excluded variables for reasons of irrelevance (lack of impact) or inability to compare (mainly incomplete data sets). The variables that were chosen initially were:

- Passenger Km (PKm) – What this variable, PKm, does show is the amount of Km travelled by passengers regardless of length of journey, frequency of journey or amount of passengers who travelled. It therefore gives a clear indication of growth over the time period. This is the dependent variable that all others are used to

predict. This variable highlights the increase in demand over the period and is the variable that needs to be explained. PKm does not include the amount of journeys taken or the number of passengers who travelled. Data for passenger journeys are based upon each journey or part of journey (a return trip counts as two journeys; a return trip with train changes counts as four or more journeys). The data set 'Passenger Journeys' has not been chosen because the data collection method changed during the period researched and the amount of journeys taken is not a true representation of demand. PKm is the variable of choice for the DfT when explaining growth within the rail industry and is widely used in transport research and is also consistent with Train Kilometres.

- Passenger Revenue per Km (RevPKm) – this variable covers the cost of rail to passengers each year excluding any subsidies received or payments made from the Train Operating Companies (TOC's) to the Government. This variable is specifically covering the cost of rail travel to passengers in the form of tickets sold – therefore RevPKm is used as a proxy for price. The variable is calculated against the amount of Km travelled and therefore gives an average cost to passengers for each Km they travel. The main problem with this variable is the inability to accurately gauge how much rail travel has increased in price, as the methodology behind price changes since privatisation has altered and the cost of tickets varies depending on length of journey (long journeys tend to be cheaper per km than short journeys); the type of ticket bought (first class is more expensive than standard tickets); and even the region that the journey takes place (the Southeast region is more expensive than most other areas). The data were calculated by dividing the total amount of revenue received each year by the total amount of Km travelled and dividing this by 1000 to give the price in £/Km. The data has also been converted to real prices using 2008 as the base year. The benefit of using this variable as a measure of cost to passengers is that it gives the measure of yield by illustrating the revenue collected per PKm – therefore the average cost to passengers of travelling by train per Km.

- Train Km (TKm) – this covers the service that is available. This variable could be slightly problematic as it covers the amount of Km that trains travelled - not capacity - therefore it does not give an indication of length of train, frequency of service, or amount of trains, but it does indicate the total Km available each year to be travelled.

Capacity will have changed over the period but this is not something that can be taken into account in the model.

- GDP[18] – this variable represents the spending power of the passengers over the time period and has been standardised to 2008 prices along with Passenger Revenue. GDP is a measure of the total economic activity of a country and is a key indicator of the economic wealth or otherwise of a nation although it may include a lagged effect as changes in the economy can take time to impact on the data.

- Privatisation Effect (PE) – this is a dummy variable that works as a 'catch all' to account for any privatisation effects not taken into account in the other variables.

There is a considered argument that quality and punctuality are important variables that should be included in the model. The impact of late and cancelled trains, and the comfort of – and facilities provided – on trains will have a bearing on the choice of rail as a mode of transport. The problem with the inclusion of these variables is the lack of data covering the entire timeline of events. As it has been explained previously there are issues with what constitutes a late train in the data and prior to privatisation the collection method was sporadic and unreliable. Passenger survey data are, by their very definition, opinions based on perceptions of quality around an unknown baseline. Even if a full data set were available, comparing this qualitative data with the collected quantitative data could open the model for additional criticism. There has been recent research into the inclusion of PPM in long run forecasting by Whelan et.al. (2010). They make use of univariate time-series and multivariate econometric approaches (Whelan et al., 2010) as well as a new application of unobserved component models based on the work of Harvey (Harvey, 2006). Due to the timescales of this research it has not been possible to learn from the methodology in order to adapt the model but the results of the work can be compared to the results that this research generates and this will be looked at in the following chapter.

Ideally, environmental costs should also be taken into account but this has proven difficult to disaggregate to specify all rail costs (or benefits). In addition, emphasis on environmental data is relatively new and therefore not available for the complete time period that is under consideration here. Instead, environmental costs were considered when the final totals were concluded and were looked at as both costs and benefits. To account for other modes, such

[18] Gross Dometstic Product is the primary indicator of the nation's health in economic terms. It represents the total value of all goods and services produced over a year.

as car and bus transport, has also proven difficult but modal transfer from car to rail could be included in the environmental costs and will again be explored in the next chapter. Data was collected as described in the methodology section and begins in 1979 and continues consistently until 2009, providing a timeline of 30 years' worth of variables to compare. Table 5-1 shows the data that has been collected and used in the analysis.

**Table 5-1 Data Variables Chosen for Regression Analysis**

| | TOT PKm (bn) | RevPKm (£km 2008) | TOT TKm | Real GDP (£m 2008) | PE |
|---|---|---|---|---|---|
| **1979-80** | 30.70 | 0.0996264 | 315.3 | 755,044 | 0 |
| **1980-81** | 30.30 | 0.1019149 | 326.8 | 748,521 | 0 |
| **1981-82** | 29.70 | 0.0997253 | 322.5 | 735,521 | 0 |
| **1982-83** | 27.20 | 0.0908989 | 286.5 | 744,714 | 0 |
| **1983-84** | 29.50 | 0.0985414 | 310.9 | 777,234 | 0 |
| **1984-85** | 29.80 | 0.097694 | 309.1 | 795,090 | 0 |
| **1985-86** | 29.70 | 0.099666 | 311.5 | 821,191 | 0 |
| **1986-87** | 30.80 | 0.10307 | 311.7 | 856,128 | 0 |
| **1987-88** | 32.40 | 0.1055983 | 325.1 | 904,483 | 0 |
| **1988-89** | 34.30 | 0.1056569 | 339.4 | 961,805 | 0 |
| **1989-90** | 33.30 | 0.1065171 | 343.5 | 977,010 | 0 |
| **1990-91** | 33.20 | 0.1053283 | 353.5 | 969,481 | 0 |
| **1991-92** | 32.50 | 0.1048729 | 353.7 | 963,849 | 0 |
| **1992-93** | 31.70 | 0.1053095 | 348.9 | 964,224 | 0 |
| **1993-94** | 30.4 | 0.1103462 | 350.2 | 1,000,920 | 0 |
| **1994-95** | 28.7 | 0.1127105 | 340.5 | 1,032,551 | 1 |
| **1995-96** | 30 | 0.114192 | 353.4 | 1,055,903 | 1 |
| **1996-97** | 32.1 | 0.1130196 | 356.7 | 1,102,234 | 1 |
| **1997-98** | 34.7 | 0.1105637 | 376.3 | 1,128,928 | 1 |
| **1998-99** | 36.3 | 0.1123273 | 405.1 | 1,160,415 | 1 |
| **1999-00** | 38.5 | 0.1137247 | 418.4 | 1,207,349 | 1 |
| **2000-01** | 38.2 | 0.1125754 | 427.2 | 1,230,432 | 1 |
| **2001-02** | 39.1 | 0.1125197 | 435.9 | 1,267,067 | 1 |
| **2002-03** | 39.7 | 0.1125657 | 443.3 | 1,312,188 | 1 |
| **2003-04** | 40.9 | 0.1125472 | 446.2 | 1,344,900 | 1 |
| **2004-05** | 42.4 | 0.1127759 | 458.4 | 1,380,684 | 1 |
| **2005-06** | 43.2 | 0.1164535 | 456.81 | 1,402,806 | 1 |
| **2006-07** | 46.2 | 0.1171149 | 461.12 | 1,427,609 | 0 |
| **2007-08** | 49.0 | 0.1178732 | 455.32 | 1,456,547 | 0 |
| **2008-09** | 50.7 | 0.1184274 | 474.48 | 1,442,921 | 0 |

Source: ORR 2010

The Passenger Kilometre data was transformed by Natural Log (ln) transformation (ln(Xi)), to help reduce positive skew and to correct any assumption of homogeneity of variance. A semi-

log transformation will allow the different data types to interact with the dependant variable. From the data it can be seen that PKm fluctuated slightly before privatisation before rising consistently after privatisation. It is this rise in passenger Km that this research seeks to explain.

From the data shown in Table 5-1 it is immediately apparent that anomalies are present. The amount of Train Km (TKm) available to be travelled reduces in 1982 and does not recover until 1984. The TKm remains fairly static during the following two years and to account for this inconsistency we need to look at the events that were occurring during this time. 1982-84 saw significant strike action on the railways that would have prevented rail travel and the subsequent two years 1984-86 saw strike action in the coal industry which may have had a serious impact on the cost and availability of fuel but would also have been a time where sympathy strikes were occurring. The amount of Train Km available then increases steadily either due to the introduction of new services or the increase in frequency of existing services. It is worth noting that this in itself is problematic as an increase in frequency of service (more trains running per hour), will have a different effect on the amount of journeys taken than an increase in route length; which will just enable people to travel further rather than more frequently. From the previous chapter we know that the route length available did not increase as dramatically as the train km would suggest, therefore it is apparent that there are more trains (and/or longer routes) that have been provided over the period. For the purpose of this research it is assumed that there has been a combination of both frequency and route length enhancement over the period, but, as mentioned before, there is nothing to suggest that capacity has also changed; it could well be shorter trains operating a more frequent service or travelling further. GDP also fell in 1982, and again in the early years of the 1990s, highlighting the difficult economic climate of that time.

Now the variables have been chosen and collated to cover the entire research time period the next step is to see how well the variables can explain the impact on demand. The next section looks at the process of determining the 'best fit' model to provide the parameters for calculating the privatisation effect.

## 5.3 Privatisation Effect

Once the variables had been chosen that were likely to best represent the impact on PKm the task of refining the model began. Basic regression analysis was chosen as the best method for forecasting demand. Regression analysis is used with naturally-occurring variables, such as

those found in this research, as opposed to experimentally manipulated variables and is the most widely used tool for forecasting (Price, 1991, Picard et al., 2010).

The chosen hypothesis is:

***The increase in Passenger Km (demand) can be predicted from the cost of travel (revenue), train service available (Train Km), purchasing power of passengers (GDP), and the effect of privatisation.***

Using the basic regression model:

$$lny_i = b_0(x_1) + b_2(x_2) + \cdots + b_p(x_p)$$

Where y = the dependent variable and $x_1$, $x_2$, ... are the independent variables, the following model can be used :

$$lny^i(lnPass\ Km) = \big(b_0 + b_1(Pass\ Rev\ Km) + b_2(Train\ Km) + b_3(GDP) + b_4(Privatisation\ Effect)\big) + \varepsilon_i(Standard\ Error\ of\ each\ Variable)$$

The dependant variable was the only variable to be included in its natural log formation; all other variables were actual data. The model used was, therefore, a semi-log or negative exponential demand model. SPSS was the chosen software to carry out the regression analysis as it was fairly easy to use and available for the research. The variables were entered using a stepwise methodology so each model has one more variable added than in the previous model. The variables were entered in the following sequence:

1) Revenue per Passenger Km
2) Train Km
3) GDP
4) Privatisation Effect

The dependent variable was Passenger Km and there were no missing variables. The order of entry was altered to determine if the sequence was important to the final outcome but the final statistics proved to remain the same regardless of order. As the stepwise method did not have any effect on the outcome, and it is a more time consuming exercise, further regression models that were tried used the block entering (or hierarchy) methodology, which is

recommended as a preferred method for standard multiple regression modelling (Field, 2005).

Privatisation was deemed to have started in 1994/95 rather than the year of privatisation, which was 1996, due to the premise that the effect of privatisation started after the decision to privatise was made and the preparation of the process of privatisation had begun. 1994/95 was chosen as a 'best guess' regarding the start of the impact of privatisation but it has been reported to have impacted earlier (Gourvish, 2002b), and could arguably be said to impacted only when the process began in 1996. Pollitt and Smith (2002) take 1996/97 as the first full year of privatisation. However, they take the last year of public ownership to be 1992/93, since this is the last year unaffected by the restructuring and privatisation programme. They include a transition period (1993/94 to 1995/96) which they say saw the restructuring of the industry and its transfer to private ownership (Pollitt and Smith, 2002). Although the franchises were privatised in little more than a year, Railtrack was established as the rail infrastructure company in 1994 but did not float on the Stock Market until 1996.

The date chosen at this stage of the research did not take into account the White Paper of 1992 and the Railways Act in 1993 and in further testing of the variables it was proven that the date chosen should have been earlier. Table 5-2 gives the results of the regression on the variables.

**Table 5-2 Regression Statistics for the Basic Model**

| **Model** | | **Adjusted R Square** | **Unstandardised Coefficients** | **Coefficients** | | **Durbin-Watson** |
|---|---|---|---|---|---|---|
| | | | *B* | *t stat* | *sig* | |
| **1** | Pass KM | | 2.653 | 11.939 | .000 | 0.826 |
| | Rev per Pass Km | .594 | -2.085 | -.860 | .398 | |
| | Train Km | .897 | .002 | 4.751 | .000 | |
| | GDP | .898 | 2.567E-7 | 1.689 | .104 | |
| | Privatisation | .957 | -.097 | -6.033 | .000 | |

Source: Data from ORR 2008, regression generated using SPSS

Both RevPKm and TKm appear to be not significant at either 5% or 10% confidence intervals. The Durbin-Watson Test statistic highlights potential problems with autocorrelation; that the deviations of observations from their expected values are correlated. The Durbin-Watson Test statistic should be around 2 (Kennedy, 2008); anything less than 1 or more than 3 shows a potential autocorrelation (Kennedy 2008 p119). As the final step of the model gives a figure of 0.826, this is significantly less than 1 and shows that further investigation is required. Autocorrelation occurs for a number of reasons including:

1. Prolonged influence of shocks (Kennedy 2008) – when using time-series data the effects of events can be prolonged and have a significant effect on the data for considerable time period
2. Inertia – this is where past actions will have an effect on current actions.
3. Spatial autocorrelation – where a shock or event in one region affects the whole data
4. Data manipulation – published data (as used in this research) may have undergone significant interpolation that averages disturbances over a time period
5. Misspecification – omitted relevant independent variables that are autocorrelated.

There is a possibility that the reasons mentioned above will apply to the variables used in this research. The Hatfield Crash did have a prolonged effect on the revenue, train kilometres and passenger kilometres. The effect was transferred across the network rather than confined to the actual area around the crash site (spatial autocorrelation). The data used in the modelling exercise is publically available and known to have been smoothed and rounded to the nearest whole number[19]. Positive autocorrelation errors can lead to an upward bias on the $R^2$ and this is apparent in the first attempt at modelling the PKm as shown in Table 5-2. There may also be a case of omitted variables, although care has been taken to ensure the impacts are all represented there may be something missing from the model. There are various ways of dealing with autocorrelation, including lagging the variables, and these are looked at closely in relation to this research in the next section.

From the table it is clear that privatisation has a slightly negative correlation with PKm travelled. This can either be explained by stating that the outcome is correct and privatisation negatively affected the amount of PKm travelled and any increase was due to reasons other than privatisation: which may have some truth in it as Wardman explained the up-turn in the economy increased the PKm during this time (Wardman, 2005). Alternatively, assumptions can be made regarding privatisation being apparent in the other variables used in the model, for example, - TKm already has a privatisation effect contained in the values as privatisation impacted the amount of Km trains travelled; RevPKm also has a privatisation effect inbuilt into the values due to privatisation and regulation impacting on the cost of tickets. This may account for some of the effects of privatisation but there should still be effects that are not part of the stated variables.

[19] The DfT, ORR and NR all ensure their data is reconciled with the data collection software - LENNON

There also needs to be consideration given to multicollinearity of variables as it is apparent that the GDP and TKm are closely related. Multicollinearity occurs when an approximate linear relationship is observed among the independent variables. It is common for multicollinearity in this form to occur. It is also common for data containing dummy variables to include some form of multicollinearity and although technically assumptions have not been violated unless an exact linear relationship is discovered the presence of approximate linear relationships must be considered due to the estimating problems that this uncovers (Kennedy 2008). The consequences of multicollinearity are a dampening down of impacts. The $R^2$ remains unchanged and, strictly speaking, the assumptions of Classic Linear Regression (CLR) are still met. The main issue that has to be considered – assuming that multicollinearity cannot be avoided – is that the parameter estimates are not precise and can lead to specification errors (Kennedy 2008).

### 5.3.1 Adapting the Model

The problems with autocorrelation and collinearity were considered significant enough to require further investigation and although the model was not rejected, alternatives needed to be considered before choosing the correct model. There are various methods that can be used to lessen the impact of these classic linear regression (CLR) assumption violators including:

1. Combining the Passenger Revenue with GDP could help sort out problems with collinearity (they are closely correlated with a coefficient value of 0.75). In order to do this the RevPkm was divided by the GDP. This gave one variable that would then first smooth out the relationship they had with each other before explaining the impact on PKm
2. Lagging the GDP by one year: this assumes that the effect of GDP on PKm is not immediate, but takes a year to impact, especially true regarding season ticket sales that are bought as much as a year in advance. There is also evidence that GDP statistics are already a year behind when published as the effect that the economy has on GDP is not immediate;
3. Testing for multi-collinearity by replacing Train KM with Train $Km^{-1}$ changes the functional form;
4. Introducing other dummy variables to account for the exceptional anomalies that appear in the data such as the strikes in 1982, the Hatfield crash in 2000 and also introducing a transitionary period to cover the effect of the transition from public to private ownership.

Before these alternative scenarios were tried the format for the Privatisation dummy variable was considered. In the original model the dummy variable was fixed at 1. This raises the question of the privatisation impact being instant and steady rather than gradual and fluctuating. Graduating the impact of privatisation through increasing and decreasing the variable was tested along with the other variables. It was hoped that the effect would show privatisation as having an increasing impact as the policy was initiated and then a gradual decrease in impact as the transition settled down. This did not appear to be the case and little reportable impacts were seen in the final statistics. One of the reasons for this occurring could be that the impact of privatisation is fairly strong in the other variables and the privatisation dummy variable is, as it has been explained as, a 'catch all' variable that accounts for those impacts not apparent or able to be explained elsewhere. As there was little impact from trialling this model the results have not been included in the thesis.

The issues of multicollinearity and autocorrelation were still evident and therefore the need for solutions had to be explored. The first three methods had little impact on the model, in the respect that they did not help to explain the changes in passenger kilometres, and were discarded. It was decided, instead, to explore various dummy variables to account for the economic changes over the time period and the industry specific events such as Hatfield. Hatfield, as a train accident, was not considered to be the worst accident to befall the rail industry in recent years: Ladbrooke Grove took many more lives the previous year (Evans, 2007, Wolmar, 2005). Yet the cause of the accident at Hatfield was detrimental to the industry in the respect that it is the infrastructure that was at fault rather than human error. The rail industry suffered huge disruption after the Hatfield crash as trains were forced to slow down while thousands of kilometres of rail were inspected for further faults. This is why the Hatfield crash, rather than any other accident, is worthy of consideration when calculating the impact of different variables on the growth in PKm.

Altering the model gives us the following regression statistics as outlined in Table 5-3. The table is interesting in that it highlights the progression of the process of defining the model. Although more than 100 different variations were tried out only a proportion are shown in the table. The years where a dummy variable has been included are outlined for each model tried, and the various regression statistics that show the relationship between the dependant variable: PKm, and the independent explanatory variables. In each case the $R^2$ shows the relative reduction in the total sum of squares (total error) when a regression line is fitted. Therefore the higher the $R^2$ (closer to 1) that each variable is, the greater the goodness of fit

and therefore better chance that any change in the variables will also enable a prediction of the change in the dependant. The adjusted $R^2$ indicates the amount of variation in the data explained by the model and identifies the impact of the variables on the change in the dependent variable. The $r^2$ will not decrease as each new variable is introduced as it cannot undo the impact of preceding variables but the adjusted $r^2$ can reduce thereby indicating that the impact of the new variable reduces the overall explanation of impact. The adjusted $r^2$ can be read as a percentage: i.e. 0.685 = 68.5%.

The Unstandardised Coefficient B is the unit increase of each variable needed to ensure a unit increase in the dependant. Therefore, for each model shown, an increase of the Coefficient B for each of the independent variables would result in an increase in PKm of the Coefficient B for PKm.

**Table 5-3 Adaptations to the Basic Model**

| Model | Years for Dummy Variables | Variables | R2 Adjusted | D-W | Unstandardised Coefficients B | Coefficients t | sig |
|---|---|---|---|---|---|---|---|
| 1 | | (Constant) | | 1.479 | 2.757 | 13.515 | .000 |
| | | RevPKm | .594 | | -3.986 | -1.631 | .116 |
| | | TKm | .897 | | .003 | 5.885 | .000 |
| | | GDP | .898 | | 2.09252E-07 | 1.556 | .133 |
| | 92/3-04/5 | PE | .957 | | -.071 | -4.985 | .000 |
| | 00/1-05/6 | Hatfield | .966 | | -.061 | -2.812 | .010 |
| 2 | | (Constant) | | 1.234 | 2.690 | 10.840 | .000 |
| | | RevPKm | .594 | | -2.518 | -.830 | .415 |
| | | TKm | .897 | | .003 | 4.554 | .000 |
| | | GDP | .898 | | 1.9734E-07 | 1.264 | .218 |
| | 93/4-04/5 | PE | .954 | | -.075 | -3.768 | .001 |
| | 00/1-04/5 | Hatfield | .954 | | -.030 | -1.024 | .316 |
| 3 | | (Constant) | | 1.574 | 2.617 | 11.710 | .000 |
| | | RevPKm | .594 | | -.940 | -.380 | .707 |
| | | TKm | .897 | | .002 | 4.616 | .000 |
| | | GDP | .898 | | 2.00302E-07 | 1.319 | .199 |
| | 92/3-04/5 | PE | .957 | | -.088 | -6.046 | .000 |
| | N/A | Hatfield | | | | | |
| 4 | | (Constant) | | 1.575 | 2.552 | 12.167 | .000 |
| | | RevPKm | .594 | | -.584 | -.253 | .802 |
| | | TKm | .897 | | .002 | 5.051 | .000 |
| | | GDP | .898 | | 2.16112E-07 | 1.532 | .138 |
| | 93/4-05/6 | PE | .963 | | -.098 | -6.803 | .000 |
| | N/A | Hatfield | | | | | |
| 5 | | (Constant) | | 1.678 | 2.603 | 13.616 | .000 |
| | | RevPKm | .594 | | -1.627 | -.693 | .495 |
| | | TKm | .897 | | .002 | 5.639 | .000 |
| | | GDP | .898 | | 2.32614E-07 | 1.929 | .066 |
| | 92/3-05/6 | PE | .973 | | -.095 | -6.051 | .000 |
| | 00/1-05/6 | Hatfield | .973 | | -.024 | -1.062 | .299 |
| 6 | | (Constant) | | 1.143 | 2.675 | 13.059 | .000 |
| | | RevPKm | .594 | | -2.897 | -1.168 | .255 |
| | | TKm | .897 | | .003 | 5.795 | .000 |
| | | GDP | .898 | | 2.02501E-07 | 1.541 | .137 |
| | 93/4-04/5 | PE | .962 | | -.083 | -5.269 | .000 |
| | 00/1-05/6 | Hatfield | .966 | | -.049 | -2.203 | .038 |

| Model | Years for Dummy Variables | Variables | R2 Adjusted | D-W | Unstandardised Coefficients B | Coefficients t | sig |
|---|---|---|---|---|---|---|---|
| | 90/1-91/2 | Recession | .968 | | -.033 | -1.463 | .157 |
| 7 | | (Constant) | | 1.636 | 2.784 | 18.442 | .000 |
| | | RevPKm | .594 | | -4.524 | -2.513 | .019 |
| | | TKm | .897 | | .003 | 8.325 | .000 |
| | | GDP | .898 | | 2.64554E-07 | 2.852 | .009 |
| | 92/3-06/7 | PE | .971 | | -.098 | -8.340 | .000 |
| | 00/1-05/6 | Hatfield | .976 | | -.053 | -3.369 | .003 |
| | 81/2-82/3 & 90/1-91/2 | Recession | .984 | | -.049 | -3.632 | .001 |
| 8 | | (Constant) | | 2.042 | 2.877 | 15.431 | .000 |
| | | RevPKm | .594 | | -5.999 | -2.729 | .012 |
| | | TKm | .897 | | .003 | 6.317 | .000 |
| | | GDP | .898 | | 3.68484E-07 | 3.119 | .005 |
| | 92/3-07/8 | PE | .955 | | -.097 | -5.998 | .000 |
| | 00/1-05/6 | Hatfield | .966 | | -.073 | -3.938 | .001 |
| | 81/2-82/3 & 90/1-91/2 | Recession | .975 | | -.050 | -2.965 | .007 |
| 9 | | (Constant) | | 1.812 | 2.787 | 18.940 | .000 |
| | | RevPKm | .594 | | -4.372 | -2.454 | .022 |
| | | TKm | .897 | | .003 | 8.412 | .000 |
| | | GDP | .898 | | 2.48255E-07 | 2.705 | .013 |
| | 92/3-05/6 | PE | .973 | | -.096 | -9.317 | .000 |
| | 00/1-06/7 | Hatfield | .976 | | -.050 | -3.205 | .004 |
| | 81/2-82/3 & 90/1-91/2 | Recession | .984 | | -.048 | -3.646 | .001 |
| 10 | | (Constant) | | 1.709 | 2.822 | 16.959 | .000 |
| | | RevPKm | .594 | | -4.898 | -2.463 | .022 |
| | | TKm | .897 | | .003 | 7.860 | .000 |
| | | GDP | .898 | | 2.49598E-07 | 2.465 | .022 |
| | 91/2-05/6 | PE | .971 | | -.089 | -8.239 | .000 |
| | 00/1-06/7 | Hatfield | .978 | | -.055 | -3.272 | .003 |
| | 81/2-82/3 | Recession/Strikes | .981 | | -.046 | -2.273 | .033 |
| 11 | | (Constant) | | 1.508 | 3.062 | 14.508 | .000 |
| | | RevPKm | .594 | | -7.332 | -3.054 | .006 |
| | | TKm | .897 | | .002 | 6.478 | .000 |
| | | GDP | .898 | | 4.14838E-07 | 3.458 | .002 |
| | 91/2-05/6 | PE | .971 | | -.084 | -7.940 | .000 |
| | 00/1-06/7 | Hatfield | .978 | | -.058 | -3.535 | .002 |
| | 82/3 | Recession/Strikes | .982 | | -.086 | -2.599 | .016 |
| 12 | | (Constant) | | 1.275 | 3.151 | 14.719 | .000 |
| | | RevPKm | .594 | | -8.455 | -3.487 | .002 |
| | | TKm | .897 | | .002 | 6.380 | .000 |
| | | GDP | .898 | | 4.34101E-07 | 3.514 | .002 |
| | 90/1-05/6 | PE | .966 | | -.080 | -7.596 | .000 |
| | 00/1-06/7 | Hatfield | .975 | | -.066 | -4.002 | .001 |
| | 82/3 | Recession/Strikes | .981 | | -.099 | -2.909 | .008 |
| 13 | | (Constant) | | 1.113 | 3.254 | 13.568 | .000 |
| | | RevPKm | .594 | | -9.396 | -3.467 | .002 |
| | | TKm | .897 | | .002 | 5.718 | .000 |
| | | GDP | .898 | | 4.20653E-07 | 3.045 | .006 |
| | 90/1-04/5 | PE | .957 | | -.065 | -5.620 | .000 |
| | 00/1-05/6 | Hatfield | .969 | | -.073 | -4.059 | .000 |
| | 82/3 | Recession/Strikes | .976 | | -.108 | -2.841 | .009 |
| 14 | | (Constant) | | 1.486 | 2.601 | 14.454 | .000 |
| | | RevPKm | .596 | | -1.480 | -.723 | .477 |
| | | TKm | .897 | | .003 | 6.049 | .000 |
| | | GDP | .898 | | 1.995E-07 | 1.645 | .113 |
| | 91/2-05/6 | PE | .971 | | -.094 | -7.177 | .000 |
| | 00/1-03/4 | Hatfield | .973 | | -.028 | -1.475 | .153 |
| | N/A | Recession/Strikes | | | | | |

| Model | Years for Dummy Variables | Variables | R2 Adjusted | D-W | Unstandardised Coefficients B | Coefficients t | sig |
|---|---|---|---|---|---|---|---|
| 15 | | (Constant) | | 1.414 | 2.659 | 14.711 | .000 |
| | | RevPKm | 0.594 | | -2.45 | -1.142 | .265 |
| | | TKm | 0.897 | | 0.003 | 6.309 | .000 |
| | | GDP | 0.898 | | 2.10E-07 | 1.785 | .087 |
| | 91/2-05/6 | PE | 0.971 | | -0.089 | -6.564 | .000 |
| | 00/1-04/5 | Hatfield | 0.974 | | -0.037 | -1.887 | .071 |
| | N/A | Recession/Strikes | | | | | |
| 16 | | (Constant) | | 1.608 | 2.66 | 14.371 | .000 |
| | | RevPKm | 0.594 | | -2.51 | -1.121 | .273 |
| | | TKm | 0.897 | | 0.003 | 6.135 | .000 |
| | | GDP | 0.898 | | 2.19E-07 | 1.834 | .079 |
| | 91/2-05/6 | PE | 0.971 | | -0.088 | -6.155 | .000 |
| | 00/1-05/6 | Hatfield | 0.973 | | -0.035 | -1.677 | .107 |
| | N/A | Recession/Strikes | | | | | |
| 17 | | (Constant) | | 1.734 | 3.060 | 12.506 | .000 |
| | | RevPKm | .594 | | -6.863 | -2.440 | .023 |
| | | TKm | .897 | | .002 | 5.537 | .000 |
| | | GDP | .898 | | 3.95118E-07 | 2.939 | .007 |
| | 91/2-05/6 | PE | .971 | | -.081 | -5.925 | .000 |
| | 00/1-05/6 | Hatfield | .973 | | -.045 | -2.280 | .032 |
| | 82/3 | Recession/Strikes | .977 | | -.086 | -2.283 | .032 |
| 18 | | (Constant) | | 1.916 | 2.817 | 14.803 | .000 |
| | | RevPKm | .594 | | -4.384 | -1.906 | .069 |
| | | TKm | .897 | | .003 | 6.715 | .000 |
| | | GDP | .898 | | 2.31378E-07 | 2.058 | .051 |
| | 91/2-05/6 | PE | .971 | | -.085 | -6.329 | .000 |
| | 00/1-05/6 | Hatfield | .973 | | -.041 | -2.057 | .051 |
| | 81/2-82/3 | Recession/Strikes | .976 | | -.046 | -2.039 | .053 |
| 19 | | (Constant) | | 1.442 | 2.966 | 12.594 | .000 |
| | | RevPKm | .594 | | -6.099 | -2.259 | .034 |
| | | TKm | .897 | | .002 | 5.821 | .000 |
| | | GDP | .898 | | 3.96382E-07 | 3.036 | .006 |
| | 92/3-05/6 | PE | .973 | | -.088 | -7.085 | .000 |
| | 00/1-06/7 | Hatfield | .976 | | -.049 | -2.671 | .014 |
| | 82/3 | Recession/Strikes | .979 | | -.072 | -1.976 | .060 |
| 20 | | (Constant) | | 1.453 | 2.923 | 17.106 | .000 |
| | | RevPKm | .594 | | -5.690 | -2.817 | .010 |
| | | TKm | .897 | | .0024 | 7.093 | .000 |
| | | GDP | .898 | | 3.68762E-07 | 3.614 | .001 |
| | 92/3-05/6 | PE | .973 | | -.092 | -8.575 | .000 |
| | 00/1-06/7 | Hatfield | .976 | | -.051 | -3.117 | .005 |
| | 82/3 & 91/2 | Recession/Strikes | .983 | | -.063 | -3.283 | .003 |

Source: Data from ORR 2008, regression generated using SPSS

Each model takes us closer to realising the closest representation of the impacts on passenger Km and conversely takes away some of the options as they are calibrated. The process shown in the table allowed for a deeper understanding of the different variables and the impact that each of them has on the prediction of changes to PKm. The Privatisation Effect (PE) was originally thought to have been best set at 1994, but Model 11 suggests Privatisation could have started as early as 1991, yet the introduction of a recession/strike variable gave other explanations to the change in PKm. The elasticity's for the three variables, RevPKm, TKm and GDP are tested for the four models that appear to represent the best explanation of the

change in the Passenger Kilometres (Table 5-4). Elasticity of demand is calculated by multiplying the coefficient B statistic by the mean value of the variable in question.

**Table 5-4 Model Elasticity's**

| Elasticities of Models | | RevPKm | TKm | GDP |
|---|---|---|---|---|
| **Model 7** | Coefficient B | -4.524 | .003 | 2.64554E-07 |
| | Mean Value | .108138560 | 373.9243 | 1064258.30 |
| | Elasticity | -0.48922681 | 1.035750291 | 0.281554268 |
| **Model 9** | Coefficient B | -4.372 | .003 | 2.48255E-07 |
| | Mean Value | .108138560 | 373.9243 | 1064258.30 |
| | Elasticity | -0.47276611 | 1.031104257 | 0.264207691 |
| **Model 11** | Coefficient B | -7.332 | .002 | 4.14838E-07 |
| | Mean Value | .108138560 | 373.9243 | 1064258.30 |
| | Elasticity | -0.79283571 | 0.894023434 | 0.441494841 |
| **Model 20** | Coefficient B | -5.690 | .002 | 3.68762E-07 |
| | Mean Value | .108138560 | 373.9243 | 1064258.30 |
| | Elasticity | -0.61530941 | 0.904923386 | 0.392458503 |

The elasticity's show that in absolute terms, compared to the parameters used in the Passenger Demand Forecasting Handbook (PDFH), the fare elasticity (RevPKm) – for the preferred model 20 – is a little on the low side (in absolute terms – this should be (and is) negative) as is the GDP elasticity, whilst the train km elasticity is a little higher than it would be liked. The fare parameter is much lower in models 7 and 9 and slightly higher in model 11. Although it appears that model 11 may be fractionally better in explaining the change in the dependent, when consideration is given to the variables included, the narrative falls down slightly – it is unlikely that privatisation can be determined to have started as early as 1991. In this respect, Model 20 appears to have the better 'fit', for all three variables.

The recent work by Whelan et. al. (2010) carried out a similar exercise to that of this research. They use a univariate time-series model similar to that used here but utilise additional variables to account for PPM and fuel. The calculated elasticities of this work are comparable to here except with the GDP and TKm. Whelan et. al. find a GDP elasticity of 0.9 and a TKm elasticity of 0.32 which is opposite to this research (Whelan et al., 2010). The research by Whelan et. al. included lagged variables which this research had decided against. This issue, along with impact of the other variables that were not included here can be assumed to be the main cause of this discrepancy. The fare elasticity is within acceptable limits in comparison and the only event this research did not include as a dummy variable, that Whelan has included, is the rail bombings by the IRA in 1994 but the impact of this event is minimal at -3%

compared to strikes of the 1980s. Had this research been available during the timescales of this work there may have been opportunities to have developed the model further. It also suggests that Whelan et al. have managed to address the potential issues of multicollinearity that this research has been unable to address.

Model 20 suggests that if fares go up 1%, demand will go down 0.615%, if the amount of train kms increases by 1%, demand will go up by 0.905%, and if the economy grows by 1%, demand will go up by 0.392%. There does appear to be a problem with multicollinearity as Train Km and GDP do appear closely related. This was a problem with the original model and as explained in the previous section, attempts to correct this have not proved viable. Table 5-5 highlights the close relationship between TKm and GDP.

**Table 5-5 Correlation between TKm and GDP**

| | | ACTKM | GDP |
|---|---|---|---|
| **ACTKM** | Pearson Correlation | 1 | .972** |
| | Sig. (2-tailed) | | .000 |
| | N | 30 | 30 |
| **GDP** | Pearson Correlation | .972** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 30 | 30 |

**. Correlation is significant at the 0.01 level (2-tailed).

Model 20 is still considered a better fit than either model 7, 9 or 11 despite their higher adjusted $R^2$ values. The Durbin-Watson stands at 1.453 and shows that even though the test statistic is edging closer to 1 than 2, significant problems with autocorrelation regardless of the correlation between TKm and GDP are reduced. The adjusted $R^2$ is 98.3 which mean 98.3% of the increase in passenger Km can be explained by the variables in the model.

Although it is usually expected that the chosen model should be the one with the highest adjusted $R^2$ (Field, 2005), model 20 has a better overall fit with regards to predicting PKm change and the narrative surrounding the variables included. The Privatisation Effect dummy variable is included from 1992/93 to 2005/06 and the Hatfield dummy variable from 2000/01 to 2006/07. It is interesting to note that the increase in PKm accelerated after 2005/06 and therefore begs the question – 'was there something that depressed the increase up to this point and was it just the effect of Hatfield or could it have been privatisation?' This is not easily answered but the assumptions that have therefore been made are:

1. The effects of privatisation on the rail industry that are not included in the other variables cease to be of any impact after 2006 and could also have depressed the PE during this time
2. The impacts of privatisation started to take effect as early as 1992 when the White Paper on privatising the rail industry was published.
3. The Hatfield crash in October 2000 had an immediate and long lasting effect on the passenger Km travelled
4. The recession/strikes of the early 1980s and 1990s did have an impact on the PKm.

The statistics that have been generated in this section can be used as a basis for calculating the impact of privatisation on the rail industry in comparison to a nationalised industry and the predictions for a privatised industry. To be able to use the model to predict the effect of privatisation we need to compare the actual events with a counterfactual scenario and also a scenario where privatisation is forecast. This will give us our three scenarios and enable the privatisation effect in the form of consumer surplus in PKm to be extrapolated.

## 5.4 The Counterfactual

The aim of this section is to examine via 'post diction' what would have happened to the British rail industry had it not been privatised – or, how does the estimated counterfactual scenario compare to predictions based on actual events that are now known. There could arguably be many counterfactuals to privatisation – a continuation of a Conservative Government, a less environmentally aware public - to name just a couple - but it is my belief that these scenarios are open to speculation and their relevance to comparison with the actual events is limited. The scenario described in this chapter therefore deserves the heading of 'the counterfactual' as it uses actual events related to the rail industry to explain the predictions and is therefore far more convincing in any comparison to the privatised industry. The counterfactual data may be estimated based on what was known at the time, but the actual events of the last fifteen years are taken into account when explanations of the calculations are given. The first part of this section describes the economic and political climate of the era before calculating the counterfactual scenario.

Although it appears from the literature that privatisation was probable rather than merely just possible for the rail industry (Gourvish 2002a), the rail industry itself was not in favour of privatisation and continued to implement long term plans for improving the railways. The main change within the industry prior to privatisation was the Organising for Quality initiative

that has been explained in a previous chapter. This attempt at commercialisation appeared to have a positive effect on rail data just prior to privatisation and it is therefore assumed that, had privatisation not happened, the industry would have continued with this strategy within a nationalised framework. PKm may not have risen in the early part of the 1990s and there is an argument for the OfQ initiative to have been yet another attempt at cost and service efficiency that would have under achieved as so many other attempts have done (Gourvish, 2002b, Riley, 2011). Nonetheless, any attempts at explaining the counterfactual of the non-privatisation of rail should reflect this policy initiative.

When calculating the counterfactual there are variables that remain fixed and others that are open to interpretation and assumptions. It is important that clarity is maintained when claiming specific 'facts'. The variables can be classified into four main areas with some overlap: political, economic, social and industry specific.

### 5.4.1 Political implications

One important consideration that needs to be taken into account is the political impact of policy changes. For the purposes of determining the counterfactual we are aware of the policy changes that have taken place and the political preferences of each subsequent government. The difference from a non-privatised setting will be that these policy responses were reacting to a privatised industry whereas the counterfactual places these policy issues within a nationalised setting. The Conservative Government, regardless of whether or not they privatised the industry, were headed in the direction of maintaining a limited railway with little improvement or increase in funds (Preston and Whelan, 1995).

In contrast, the three Labour Governments of 1997 to 2010 have dominated the majority of the counterfactual period and were not, initially, in favour of the privatisation of the industry. That said, Engle gives an alternative opinion on the Labour Parties 'strong opposition' to the privatisation proposals (Ivaldi, 2008). He states that with the rail industry needing continual funds and support and no alternative proposals for improving efficiency to be found, they actually gave implicit support to the privatisation plans and could, had they wished, forced the Conservative Government to change the proposals far more radically than they did (Engles, 2009).

It could also be said that the privatisation of the industry actually helped the incoming Labour Government to regulate for an integrated transport plan and that the privatised structure and competitive nature of the franchise operators to increase efficiency and revenues made it

easier for them to take integration on as a policy and then practice. Engle's suggestion also adds weight to the idea of property rights theory in regards to railway ownership and would also have allowed the Labour Government to have distanced themselves from any failures of the industry that could have been due to privatisation.

It is assumed that the integration of transport modes would have continued under a nationalised framework and funds would have been made available to increase the network coverage and capacity to accommodate these policies. The change of government in 1997 is of course an actual event and the privatisation of the rail industry, although it may have been a contributing factor to the Conservatives losing the election, cannot be held responsible for it. Therefore the change in government was an actual fact; it is only the policy implications of the change that are open to interpretation. If privatisation is assumed to have begun when the decision to privatise was made in 1992, with the July publication of the White Paper (1992), then the Conservatives had only just won the general election three months previously and had another five years to run before the change in government. The counterfactual would therefore have two different policies over the period to account for.

### 5.4.2 Economic implications

It would be fair to assume that the economic climate of the country would have continued along the path that it did, regardless of the privatisation of the rail industry. What would need to be taken into account though, are the changes in the rail budget that would have occurred. There would not have been the extra funds from the sale of the various separated companies but there would also have been the extra billions of pounds that the privatisation initiative had cost: £5bn according to a report by the Rail Consultancy (Harris and Godward 1997) although this figure has been heavily disputed and will depend on the cost variables that are included in the calculation. Organising for Quality, the industry attempt at commercialisation, was estimated to cost around £50 - £70 million (Gourvish 2002a), considerably less than the privatisation initiative regardless of how the privatisation initiative is costed. The Conservative Government believed that the decrease in subsidy payments and income generated from the sales would be recouped over the forthcoming years. That this has not happened is not an issue for the counterfactual to take into account but for the predictions for privatisation and the Conservative assumptions.

It is fairly safe to assume that the costs of maintenance, renewal, labour and materials would have risen in much the same way that they have. Organising for Quality had seen the removal

of management structures that were labour heavy and streamlining of services and operations was becoming more commercialised and therefore more economic than it had been. It could therefore be argued that coupled with the policy implications of stagnation and the apparent value for money service that was developed under OfQ the economic health of the railways under a continued nationalised policy may have seen reduced costs if not increased service.

### 5.4.3 **Social implications**

Although it is fair to say that social behaviour of the population would have followed the same path that it has, regardless of any privatisation initiatives, there need to be some assumptions made regarding the behaviour of passengers during this time. Congestion, the growth in cheap air travel, and environmental concerns, would all have to be factored into the counterfactual period, but how these would have impacted on the rail industry is open to suggestion. Assumptions based on the passenger surveys need to be made regarding the degree of patronage that has evolved from the increased comfort and general passenger improvements that have occurred over the period. How much of this is due to privatisation and how much would have occurred anyway are important considerations.

It was seen in the previous chapter that the choice of transport mode has changed fairly dramatically over the last fifty years. Since privatisation of the rail industry the bus industry has remained fairly static but until recently car use has increased steadily – the increase in fuel costs and reduction in young drivers has recently impacted on car use – this coupled with congestion and lengthening of 'peak' times has helped to slow down, and revert in many cases, the continued upward trend in car use. Domestic flights are in direct competition with Long Distance Rail yet cheaper and more frequent flights have not stopped the Long Distance Rail Sector from growing steadily. It is usually the impact of high speed rail that is compared to flights (Gonzalez-Savignat, 2004, Vickerman, 1997) but, as the previous section has shown, the Long Distance Rail Sector also compares favourably.

An issue that is rarely covered in rail literature is the branding of British Rail (Lovegrove, 2004). The rail industry has always evoked a sense of national pride, both positively and negatively, and the privatisation of the industry has taken this brand away, or at the very least diluted it into a variety of other brands. Instead of having one brand – British Rail – to love or hate there are now at least 18 franchises and NR and the ORR. This has also meant that there is no longer one person with a vision for the industry as there was with BR. There is no-one to guide the

industry with the passion and authority that the Chairman of BR used to wield. Although much can be attributed to nostalgia there are possible considerations regarding the separate branding of the individual franchise companies and the impact this will have had on privatisation and conversely what the brand 'British Rail' would have continued to have given the industry had it not been privatised.

### 5.4.4 **Rail industry**

Apart from the political, economic and social implications, there are also industry issues that need to be accounted for. Wages, working conditions, and general human resource issues would all have played a part in the counterfactual. The Hatfield crash in October 2000 was specific to the rail industry and also privatisation. For the purposes of the counterfactual it is assumed that the Hatfield disaster – an event that has so dominated the first part of the current new millennium – would not have happened if privatisation had not gone ahead. This assumption is based on the widely held view that the incident resulted from mismanagement of the infrastructure by the accountants who were in charge of the infrastructure company, Railtrack (Stittle, 2002, Pollitt and Smith, 2002). It is unlikely, given the policies of the Conservative Government; the service provided (TKm) would have increased by much. Fare increases are assumed to have continued under a nationalised industry due to the need for investment and increased revenue needed to support this.

The Conservative model of rail development allowed for limited growth and expected patronage to level off and stagnate, possibly even decline. The majority of passengers were assumed to be commuters and occasional leisure travellers. The forecasts for the industry from 1992 onwards would therefore reflect this trend. The reason the trend would start prior to 1995/6 is that privatisation was decided in 1992 and, if this had not happened, it would have been at this date that the continuation of the conservative policy would have started to have had an effect on the actual figures rather than the start of the preparation for privatisation. Passenger numbers would remain stable, revenue would increase as prices went up, maintenance would have continued on an 'as needed' basis and renewals would have been minimal. The trend would have possibly changed slightly in 1997 when the Labour Government initiated a policy of integration with other modes but prices would have been likely to increase in order to fund this.

Now the scene is set, the data has to be manipulated to mirror a counterfactual scenario. The next section looks at the variables used and how they were calculated.

## 5.5 Providing a Counterfactual Scenario using Moving Averages

It is not possible to know exactly what the counterfactual would have looked like and there are no rail industries that are suitably comparable. The best method of determining the counterfactual is to assume; all things considered; that the past is a prediction of the future and therefore the average would prevail. The methodology section has considered various options and their associated problems with representation and after careful consideration the decision was made to use five year moving averages. Using five year moving averages to generate a linear trend was not a decision taken lightly, but when compared to other solutions it seems the simplest and most adaptable methodology (as shown in the methodology chapter).

Taking into account the nature of the various methods available the research here has used an ARIMA (autoregressive integrated moving average) methodology to calculate the predicted privatised and non-privatised (counterfactual) trends of the rail industry. The reasons for choosing this method lie in the ease of modelling the various different variables for both cost and kilometres. As explained previously, it is not necessarily the purpose of this thesis to provide a comprehensive econometric guide, but rather to use econometrics as a means to an end. When combining time series data with regression modelling it is important to remember that time series data can be decomposed to exhibit one or more of the following components:

1. Trend component – either a broad rise or fall over time
2. Seasonal Component – data within the year shows peaks and troughs but the yearly trend shows regularity
3. Cyclical component – cycles are over a medium or long term
4. Irregular component – an unprecedented and unpredictable event such as the stock market crash (Field 2005).

For the rail industry there have been various irregular events over the years: the BR strikes of 1982 and the Hatfield crash in October 2000 to name a few: and for forecasting purposes they must be removed, or smoothed over, which is where using five year moving averages as a base for prediction helps.

Although privatisation did not actually occur until 1995/96, the White Paper for reform was published in 1992 and the preliminary moves towards privatisation such as land sales and asset management would have preceded the actual event. On the other hand, the recession years of the early 1990s would impact heavily on the forecasts for the future if the economic

recovery is not accounted for when calculating the moving averages. After considerable thought it was decided to calculate moving averages using data up to and including 1994/95. When calculating five year moving averages the actual data generated initially is up to two years prior to the last actual data set; therefore, the data generated took the averaged data set up to 1992/93. This provides consistency with the preferred model choice which assumes that the effect of privatisation began in 1992/93. The new averaged data was then used to predict the future trends in TKm and RevPKm and these variables were then compared.

GDP is assumed to be unaffected by the privatisation process. Although the data does reflect the impact of the social and economic events over the years, it is pushing the boundaries of assumptions to estimate the impact of these factors on the data. Therefore, actual GDP figures can be used but the Train Km and Revenue per Passenger Km will all need to be calculated using five year moving averages.

Initially the two variables were calculated and centred. Using a five year moving average helps eliminate any 'seasonal' or cyclical variations such as the strike action in 1982 and the recession years during the 1990s (Gardner 1985). Each rolling five year period is totalled and then averaged giving a rolling five year average over time. The last column of each variable is the mean of two years of five year averages. By averaging a rolling two years of the moving averages ensures the data is 'centred' and anomalies and irregularities are eliminated as much as possible. The results of the moving averages are shown in Table 5-6.

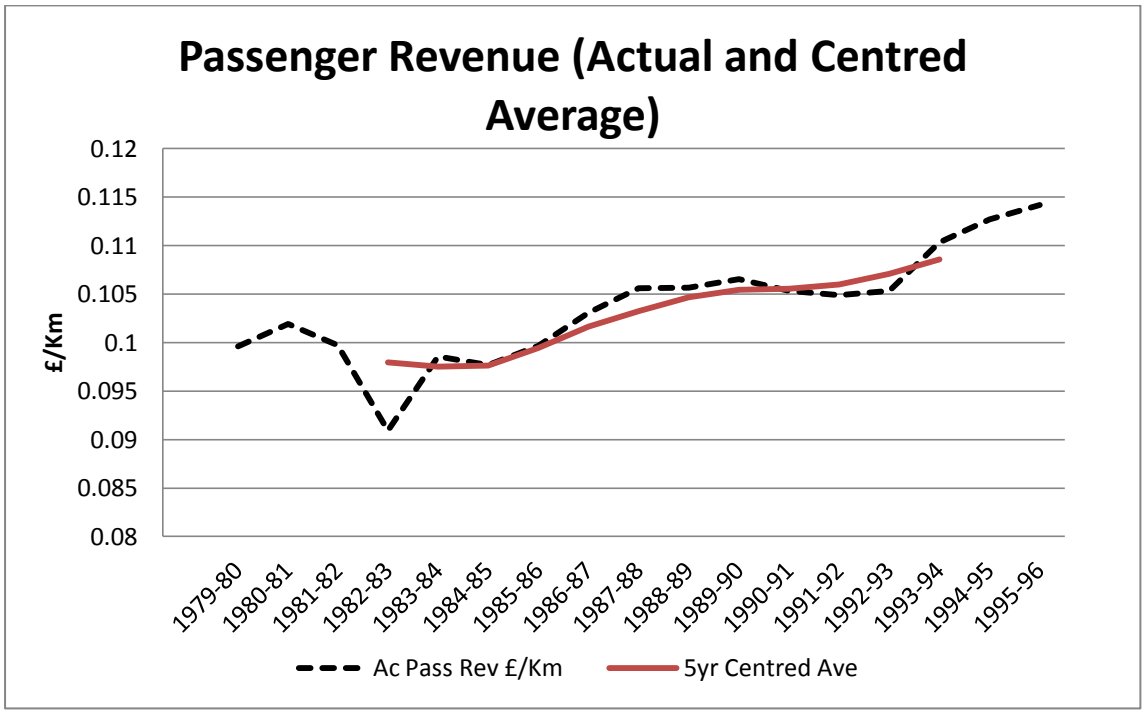
**Table 5-6 Five year moving averages on Revenue per Km and Train Km**

| Year | RevPKm £/Km | Total 5yr | 5yr Ave | 5yr Centred Ave | Ac Train Km (m) | Total 5yr | 5yr Ave | 5yr Centred Ave |
|---|---|---|---|---|---|---|---|---|
| **1979-80** | 0.099626 | | | | 315.3 | | | |
| **1980-81** | 0.101915 | | | | 326.8 | | | |
| **1981-82** | 0.099725 | 0.490707 | 0.098141 | | 322.5 | 1562 | 312.4 | |
| **1982-83** | 0.090899 | 0.488774 | 0.097755 | 0.097948 | 286.5 | 1555.8 | 311.16 | 311.78 |
| **1983-84** | 0.098541 | 0.486525 | 0.097305 | 0.09753 | 310.9 | 1540.5 | 308.1 | 309.63 |
| **1984-85** | 0.097694 | 0.48987 | 0.097974 | 0.09764 | 309.1 | 1529.7 | 305.94 | 307.02 |
| **1985-86** | 0.099666 | 0.50457 | 0.100914 | 0.099444 | 311.5 | 1568.3 | 313.66 | 309.8 |
| **1986-87** | 0.10307 | 0.511685 | 0.102337 | 0.101625 | 311.7 | 1596.8 | 319.36 | 316.51 |
| **1987-88** | 0.105598 | 0.520508 | 0.104102 | 0.103219 | 325.1 | 1631.2 | 326.24 | 322.8 |
| **1988-89** | 0.105657 | 0.526171 | 0.105234 | 0.104668 | 339.4 | 1673.2 | 334.64 | 330.44 |
| **1989-90** | 0.106517 | 0.527974 | 0.105595 | 0.105414 | 343.5 | 1715.2 | 343.04 | 338.84 |
| **1990-91** | 0.105328 | 0.527685 | 0.105537 | 0.105566 | 353.5 | 1739 | 347.8 | 345.42 |
| **1991-92** | 0.104873 | 0.532374 | 0.106475 | 0.106006 | 353.7 | 1749.8 | 349.96 | 348.88 |
| **1992-93** | 0.10531 | 0.538567 | 0.107713 | 0.107094 | 348.9 | 1746.8 | 349.36 | 349.66 |
| **1993-94** | 0.110346 | 0.547431 | 0.109486 | 0.1086 | 350.2 | 1746.7 | 349.34 | 349.35 |
| **1994-95** | 0.11271 | | | | 340.5 | | | |
| **1995-96** | 0.114192 | | | | 353.4 | | | |

Source: Original data from ORR 2009

The results for each variable show how each trend line (5yr centred average) smoothes out the data and disposes of irregularities. (See Figure 5-1 and Figure 5-2)

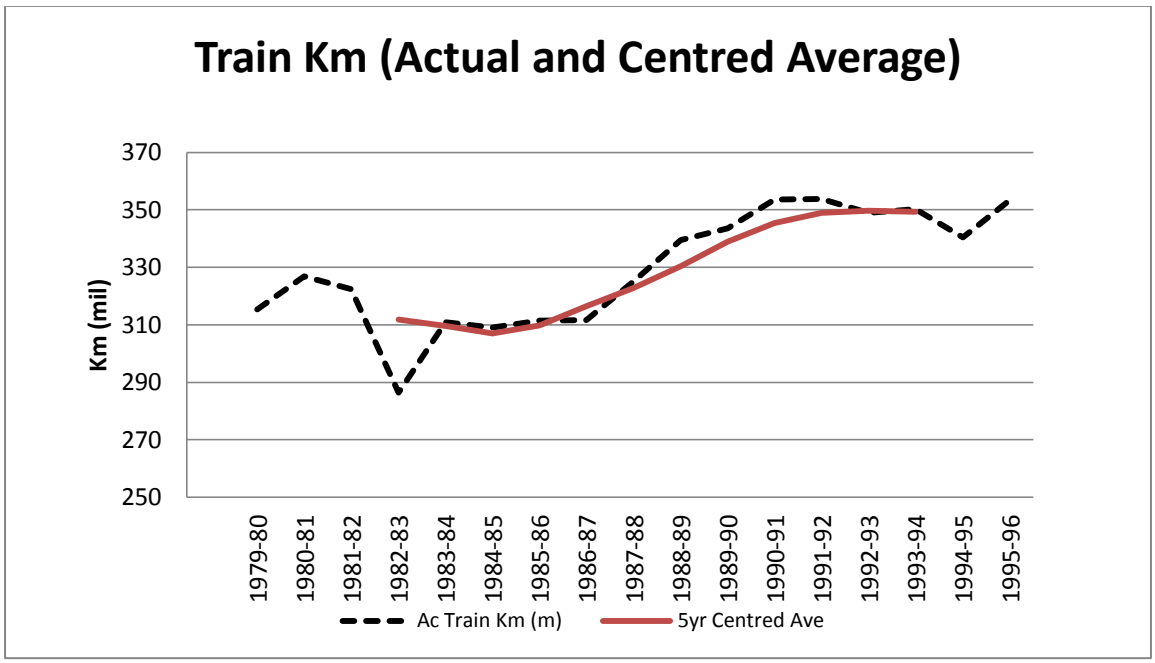
**Figure 5-1 Actual Passenger Revenue and Centred Moving Average**




Source: Original data from ORR 2009

---

**Figure 5-2 Actual Train Km and Centred Moving Average**




Source: Original data from ORR 2009

If quarterly data were to be used the next stage would be to identify the seasonal component (S), and calculate the distance from the trend (T) (Burton et al., 2002). The yearly data has no seasonal variations and does not appear to have specific cycles; therefore this stage can be

omitted. The averages that have been calculated can now be used to forecast the future trends. Forecasting for a long time period is not an exact science since it cannot account for major changes in regulation, the economy, or variations in personal choice that may prove longer term and therefore impact on the data thereafter. Therefore, the further into the future the predictions go, the less rugged the analysis may be. Predictions are only reliable if past relations between the variables continue and if the line of least squares is a good fit to begin with.

Using simple regression, where the least squares line is combined with the analysis of time series data, a regression line can be extrapolated and used to forecast future expectations of patronage (passenger Km), revenue and train Km. The table in appendix 2 gives the calculations for the three variables. The slight difference with this model compared with standard ARIMA is that rather than finding the average parameter increase of the pre privatisation era and adding it onto each year forward, the parameter for each year after the base year (12 = 1992/3) is calculated and then the total included for the next years forecast. This alters the statistic slightly each year and has the effect of smoothing out the trend whilst building on the previous forecasts. Table 5-7 gives the estimated growth based on the counterfactual scenario using moving averages.

**Table 5-7 Forecast and Actual Trends**

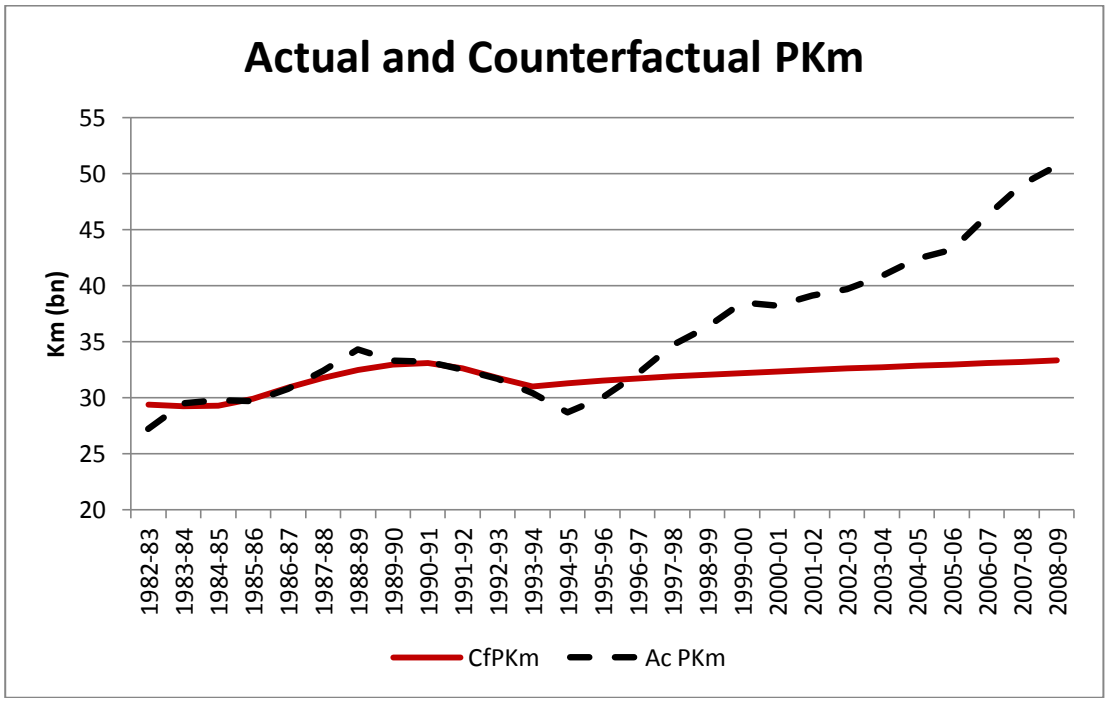
| | CfPKm | Ac PKm | CfRevPKm | Ac RevPKm | CfTKm | Ac TKm | Ac GDP |
|---|---|---|---|---|---|---|---|
| 1982-83 | 29.39 | 27.2 | 0.097948 | 0.090899 | 311.78 | 286.5 | 744,714 |
| 1983-84 | 29.24 | 29.5 | 0.09753 | 0.098541 | 309.63 | 310.9 | 777,234 |
| 1984-85 | 29.29 | 29.8 | 0.09764 | 0.097694 | 307.02 | 309.1 | 795,090 |
| 1985-86 | 29.92 | 29.7 | 0.099444 | 0.099666 | 309.8 | 311.5 | 821,191 |
| 1986-87 | 30.92 | 30.8 | 0.101625 | 0.10307 | 316.51 | 311.7 | 856,128 |
| 1987-88 | 31.75 | 32.4 | 0.103219 | 0.105598 | 322.8 | 325.1 | 904,483 |
| 1988-89 | 32.45 | 34.3 | 0.104668 | 0.105657 | 330.44 | 339.4 | 961,805 |
| 1989-90 | 32.97 | 33.3 | 0.105414 | 0.106517 | 338.84 | 343.5 | 977,010 |
| 1990-91 | 33.07 | 33.2 | 0.105566 | 0.105328 | 345.42 | 353.5 | 969,481 |
| 1991-92 | 32.61 | 32.5 | 0.106006 | 0.104873 | 348.88 | 353.7 | 963,849 |
| 1992-93 | 31.76 | 31.7 | 0.107094 | 0.10531 | 349.66 | 348.9 | 964,224 |
| 1993-94 | 30.98 | 30.4 | 0.1086 | 0.110346 | 349.35 | 350.2 | 1,000,920 |
| 1994-95 | 31.28073 | 28.7 | 0.109667 | 0.11271 | 353.9629 | 340.5 | 1,032,551 |
| 1995-96 | 31.51982 | 30 | 0.110729 | 0.114192 | 358.4319 | 353.4 | 1,055,903 |
| 1996-97 | 31.72017 | 32.1 | 0.111787 | 0.11302 | 362.8104 | 356.7 | 1,102,234 |
| 1997-98 | 31.89532 | 34.7 | 0.112843 | 0.110564 | 367.1302 | 376.3 | 1,128,928 |
| 1998-99 | 32.05363 | 36.3 | 0.113898 | 0.112327 | 371.4106 | 405.1 | 1,160,415 |
| 1999-00 | 32.20037 | 38.5 | 0.114951 | 0.113725 | 375.664 | 418.4 | 1,207,349 |
| 2000-01 | 32.33899 | 38.2 | 0.116004 | 0.112575 | 379.8985 | 427.2 | 1,230,432 |
| 2001-02 | 32.4718 | 39.1 | 0.117057 | 0.11252 | 384.1194 | 435.9 | 1,267,067 |
| 2002-03 | 32.60038 | 39.7 | 0.118109 | 0.112566 | 388.3304 | 443.3 | 1,312,188 |
| 2003-04 | 32.72583 | 40.9 | 0.11916 | 0.112547 | 392.5341 | 446.2 | 1,344,900 |
| 2004-05 | 32.84892 | 42.4 | 0.120212 | 0.112776 | 396.7323 | 458.4 | 1,380,684 |
| 2005-06 | 32.97023 | 43.2 | 0.121263 | 0.116453 | 400.9263 | 456.81 | 1,402,806 |
| 2006-07 | 33.09015 | 46.2 | 0.122314 | 0.117115 | 405.1171 | 461.12 | 1,427,609 |
| 2007-08 | 33.20901 | 49 | 0.123365 | 0.117873 | 409.3054 | 455.32 | 1,456,547 |
| 2008-09 | 33.32701 | 50.7 | 0.124416 | 0.118427 | 413.4918 | 474.48 | 1,442,921 |

Source: Original data from ORR 2008

Revenue per Passenger km is predicted to rise to a slightly greater degree than has been seen in the actual trends and this can be explained through the increase in price that would have occurred. Regulation has kept many prices low – although public perception is very different! Train Km is expected to rise at negligible rates compared to what has actually been seen. This relates to a counterfactual scenario under a Thatcher Government where the service was not expected to increase and fare rises would reduce demand but maintain income. Passenger Km, based on the moving averages to predict a counterfactual scenario, shows a slight increase in trend and when applied to a counterfactual scenario this would account for increases in population and commuting workforce but the policy of fare rises would have prevented any additional increase in demand.

The Counterfactual can be seen to represent a fair assumption of what the industry may have looked like if it had not been privatised so it is interesting that considering the revenue has remained fairly true to the actual revenue the PKm (demand) has grown exponentially under a privatised policy. This cannot be explained by the increase in TKm alone and will need to be explained further to understand how much of the increase is due to privatisation and how much would have occurred regardless. The following figures highlight the trends of a counterfactual and actual scenario.

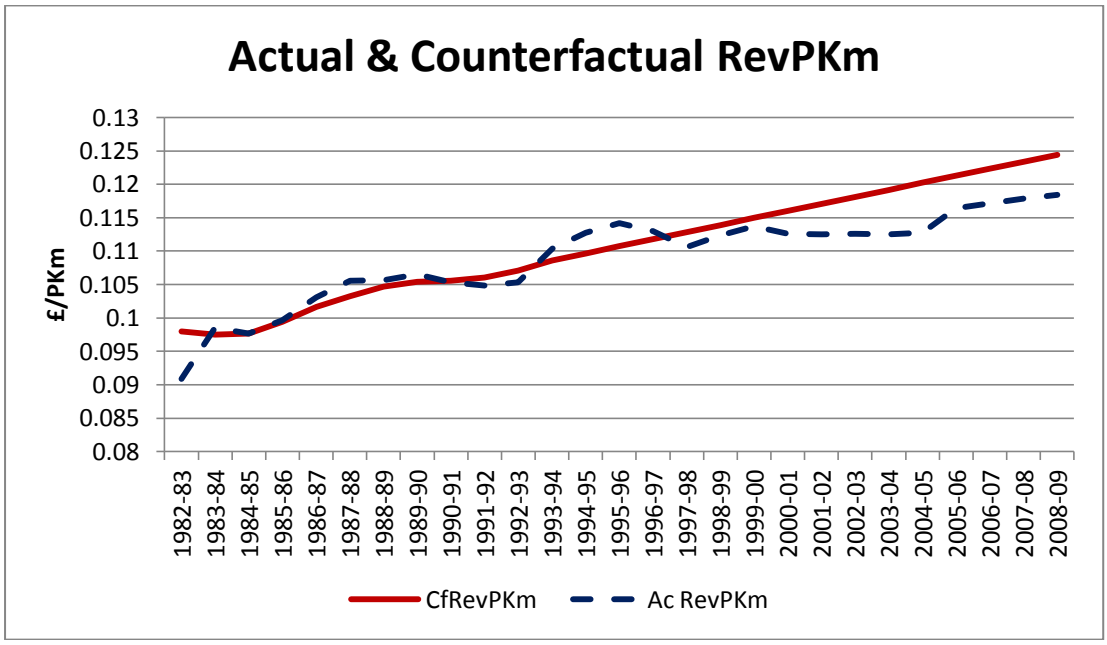
**Figure 5-3 Actual and Forecast trends in Passenger Km**




Source: Original data from ORR 2009

The counterfactual in Figure 5-3 shows a slight growth that, based on previous data, would have occurred. This can be attributed to a number of factors including the rise in population and increase in wealth and surplus income. It highlights the Conservative agenda of a stagnant railway. Prior to privatisation there was an increase in Revenue (Figure 5-4). This is picked up in the moving averages and is one of the possible causes of the predicted rise in revenue above that which has actually been seen.

**Figure 5-4 Actual and Forecast Trends in Passenger Revenue**



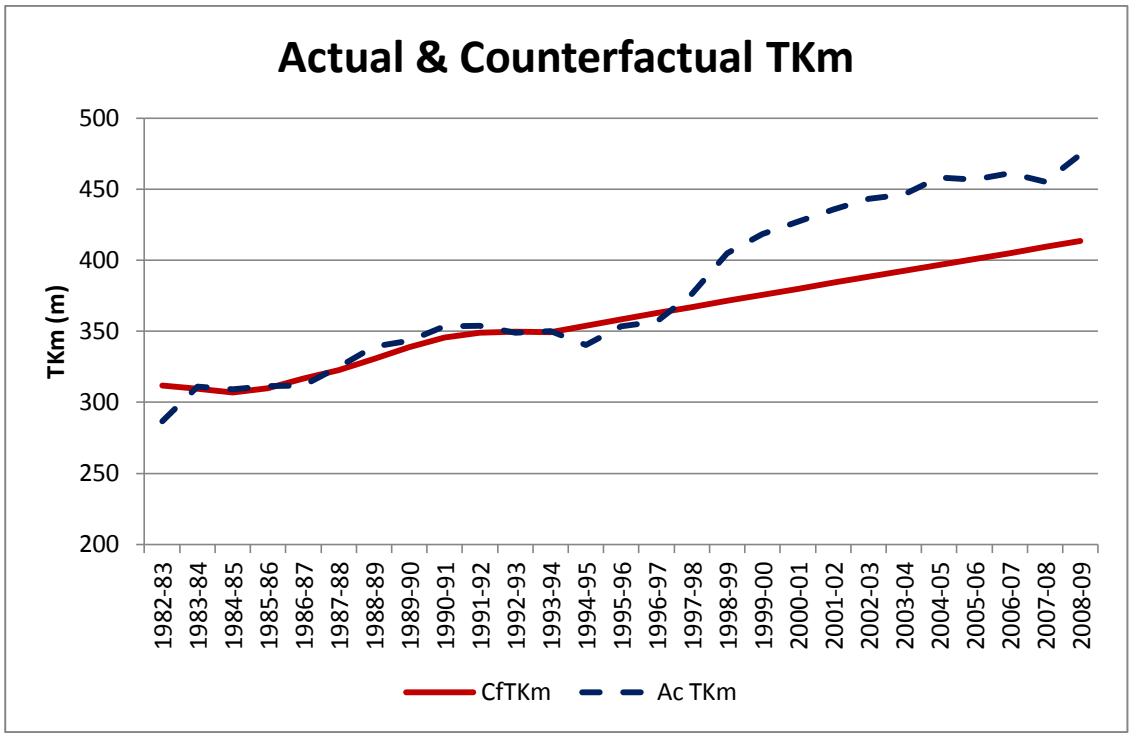

Source: Original data from ORR 2009

It could be argued that a rail industry without privatisation would have seen the increases in RevPKm that have been predicted if the original aim of running the railways at a profit had been maintained. Regulation has prevented TOCs from increasing those fares that are deemed socially necessary and those routes that are competitive between operators have had to maintain competitive rates. The RevPKm is revenue disaggregated by passenger kilometre and will therefore reflect the growth in PKm. Had the PKm not risen the RevPKm would have been much smaller had the same service and price still been maintained.

The amount of Km available to travel continues to rise during the counterfactual (Figure 5-5). The actual TKm has risen much higher though. As mentioned in the previous chapter, there is a need to understand that the actual rise may be due to a combination of factors and it may not mean extra capacity but shorter and more frequent services. We know that there has been additional route length and an increase in the amount of trains but there is also an argument that the increases in technology that now allow for trains to run closer together without the risk of accident would have occurred regardless of the privatisation initiative. It could also be said that much of this technology advancement could have been implemented more effectively under a nationalised industry due to the ownership issues and operational boundaries that are apparent under a fractured and privately owned industry. Alternatively it may have been the case that there would have been little change due to the inability of the

Treasury to fund technology advancements on a grand scale and the changes would have occurred at similar times, albeit for different reasons, under a nationalised scenario.

**Figure 5-5 Actual and Forecast Train Km**




Source: Original data from ORR 2009

Although the counterfactual data that has been generated can be explained by the events that have occurred, the counterfactual rise in RevPKm appears to show increases in revenue over and above that which would be expected under a counterfactual scenario. Revenue was expected to increase – raised fares, reduced costs, slimline and efficient service provision – but because the rise is over and above that which has actually occurred it is worth testing the reality at this point before the data is used in the cost benefit analysis. This can be achieved using the product of the counterfactual PKm and RevPKm as the counterfactual estimate of Revenue:

***CfPKm x CfRevPKm (x 100 to give £mil) = CfRev***

This will give us an understanding of the actual revenue that would have been generated rather than the revenue per passenger kilometre. To achieve this, the PKm is calculated to provide a counterfactual using the same method of moving averages as before also shown in Appendix 1). The final counterfactual data is then multiplied together each year to give the counterfactual revenue (Table 5-8) with the equation being:

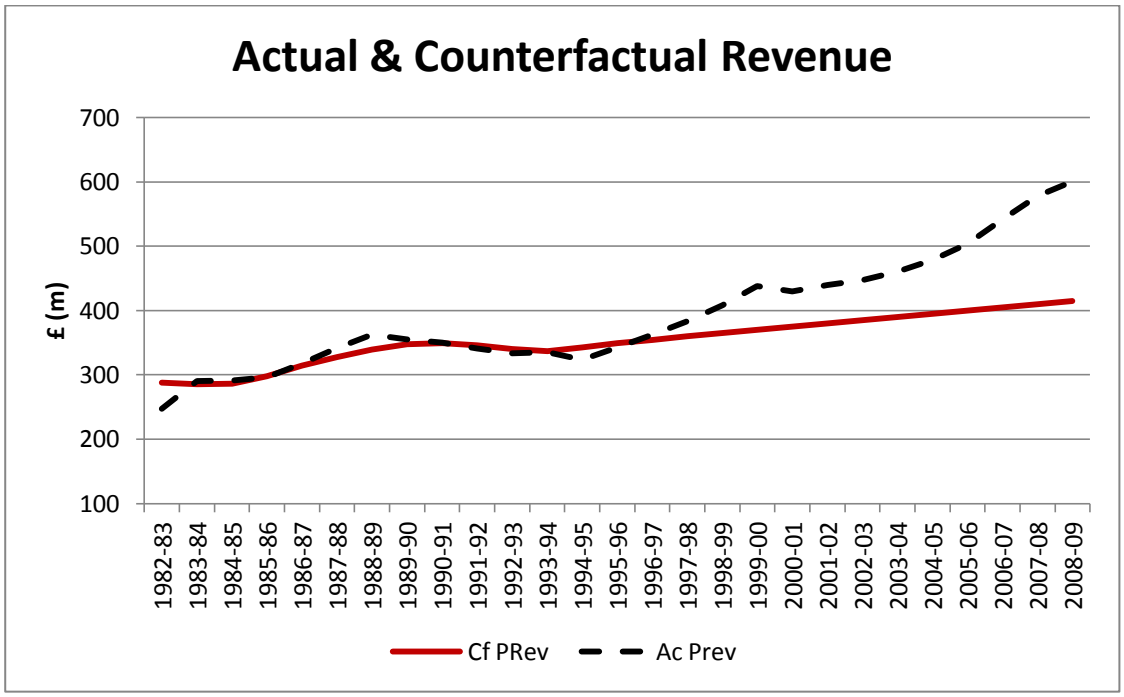
***CfPKm(n) x CfRevPKm(n) = CfRev(n)***

**Table 5-8 RevPKm and Total Revenue – Actual and Counterfactual**

| | CfPKm x | CfRevPKm = | CfRev | Ac Prev (£m 2008) |
|---|---|---|---|---|
| **1982-83** | 29.39 | 0.097948 | 287.8695 | 247.245 |
| **1983-84** | 29.24 | 0.09753 | 285.1777 | 290.697 |
| **1984-85** | 29.29 | 0.09764 | 285.9863 | 291.128 |
| **1985-86** | 29.92 | 0.099444 | 297.5364 | 296.008 |
| **1986-87** | 30.92 | 0.101625 | 314.226 | 317.4556 |
| **1987-88** | 31.75 | 0.103219 | 327.7214 | 342.1386 |
| **1988-89** | 32.45 | 0.104668 | 339.6473 | 362.403 |
| **1989-90** | 32.97 | 0.105414 | 347.5513 | 354.702 |
| **1990-91** | 33.07 | 0.105566 | 349.1062 | 349.69 |
| **1991-92** | 32.61 | 0.106006 | 345.6852 | 340.837 |
| **1992-93** | 31.76 | 0.107094 | 340.131 | 333.8313 |
| **1993-94** | 30.98 | 0.1086 | 336.4424 | 335.4525 |
| **1994-95** | 31.28073 | 0.109667 | 343.0468 | 323.479 |
| **1995-96** | 31.51982 | 0.110729 | 349.0155 | 342.576 |
| **1996-97** | 31.72017 | 0.111787 | 354.5909 | 362.793 |
| **1997-98** | 31.89532 | 0.112843 | 359.9174 | 383.656 |
| **1998-99** | 32.05363 | 0.113898 | 365.0841 | 407.748 |
| **1999-00** | 32.20037 | 0.114951 | 370.1479 | 437.84 |
| **2000-01** | 32.33899 | 0.116004 | 375.1462 | 430.038 |
| **2001-02** | 32.4718 | 0.117057 | 380.104 | 439.952 |
| **2002-03** | 32.60038 | 0.118109 | 385.0385 | 446.886 |
| **2003-04** | 32.72583 | 0.11916 | 389.9618 | 460.318 |
| **2004-05** | 32.84892 | 0.120212 | 394.8826 | 478.17 |
| **2005-06** | 32.97023 | 0.121263 | 399.807 | 503.2031 |
| **2006-07** | 33.09015 | 0.122314 | 404.7396 | 541.287 |
| **2007-08** | 33.20901 | 0.123365 | 409.6839 | 577.6701 |
| **2008-09** | 33.32701 | 0.124416 | 414.6424 | 600.4012 |

Once converted to total revenue the amount of revenue expected under the counterfactual is considerably less than what has actually occurred. This highlights that the rising fares under the counterfactual scenario would have meant an increase in the revenue per passenger Km rather than an increase in total revenue. This is shown graphically in Figure 5-6.

**Figure 5-6 Actual and Counterfactual Revenue**




Source: Original Data ORR 2009

The data still shows an increase but the actual revenue is far above any that would have been generated under a counterfactual scenario. The narrative supporting this is that the data is consistent with a counterfactual scenario where ticket prices would have risen to pay for the general maintenance of keeping the network running rather than to ensure a profit or enlarge the network through renewals. The actual variable 'revenue' cannot be used in the modelling exercise as it is not directly comparable with the variables PKm and TKm therefore this rise in revenue can be taken as explanatory and is used to underpin the counterfactual narrative.

The argument for stopping the data at 1995 is robust in the respect that data included in averaging after this period will have some privatisation effect evident and therefore transferred. It could also be argued, though, that if privatisation had not gone ahead the Conservative Government may still have carried out their plan of stagnation within the industry and running OfQ to maximise profit from a streamlined railway. The forecast data would therefore have looked similar. In the final section of this chapter the moving averages will be used to help predict the PKm for the counterfactual and forecasts for a privatised industry, but first, the forecasts for a privatised industry need to be set out so the privatisation impacts can be identified. It is here that the 'growth that would have occurred anyway' is identified.

### 5.5.1 Forecasts for a Privatised Industry

The forecasts for a privatised industry are not necessarily based on future prediction from 1995, estimating the GDP, RevPKm and TKm. It is not possible, or necessary, for the purposes of this research, to try and work out what was predicted at the time. The essence of this research is to explain the growth in PKm that is over and above that which is predicted from what has actually happened with the other variables. The GDP variable gives an understanding of the spending power of passengers and the revenue tells us how much money is made per kilometre travelled by passengers. The TKm gives a good indication of the service that is being provided and we can therefore work out from the actual data and the model that was developed in the previous section, what the PKm should have been if all things remained the same. The forecasts for a predicted privatised industry are therefore not actually about what it was thought would happen once privatisation was initiated but rather that which should have happened based on what has actually happened!

The difference between what the forecasts predict and what has actually occurred is the growth that needs to be explained. If we take the counterfactual away from the predictions: the counterfactual represents the growth that would have occurred anyway: we are left with growth that can be attributed to the privatisation effect. The following section looks at how this calculation, of what is essentially the consumer surplus (CS), is calculated ready for inclusion in the estimation of the overall costs and benefits of the privatisation initiative.

## 5.6 Comparison and Explanations of the Three Scenarios

This section develops a privatisation forecast and looks at the differences between the three rail industry scenarios and then measures the growth in PKm for a counterfactual, predicted and privatised scenario. The first step is to build the data and, using the preferred model 20, run the forecasting model. In each case the model that was used is given, followed by a table of the data that was used, and the PKm that was generated by the model. The model is a semi-logged regression model where PKm is the logged variable. Once the model has been run the PKm is then returned to its exponential for graphic and analytical purposes.

In order to find the predicted lnPKm for a counterfactual scenario the modelled coefficient B parameter for PKm is added to the forecast RevPKm, forecast TKm, and actual GDP multiplied by their modelled coefficients for each year after 1992. The dummy variables are omitted for the counterfactual scenario.

Where: *For the Counterfactual:*

$$\boldsymbol{ln(n)PKm = \alpha + b\,(n)\widehat{Rev} + c\,(n)\widehat{TKm} + d\,(n)GDP}$$

As this is a counterfactual model the PE and Hatfield variables are omitted from the model as privatisation did not occur and it is assumed that the Hatfield crash is a product of the privatisation initiative.

The model is developed with the coefficient B statistics for each variable which equates to:

$$\boldsymbol{ln(n)PKm = 2.923 - 5.69(n)\widehat{Rev} + 0.0024(n)\widehat{TKm} + 3.69E - 7(n)GDP}$$

Table 5-9 shows the data for the counterfactual scenario after this calculation has been run for each year.

**Table 5-9 Counterfactual Forecasts for PKm**

| Date | Cf LnPKm | Cf RevPKm | Cf TKm | Ac GDP |
|---|---|---|---|---|
| **1992-93** | 3.508616907 | 0.107094 | 349.66 | 964,224 |
| **1993-94** | 3.512846241 | 0.1086 | 349.35 | 1,000,920 |
| **1994-95** | 3.529516256 | 0.109667 | 353.9629 | 1,032,551 |
| **1995-96** | 3.54281738 | 0.110729 | 358.4319 | 1,055,903 |
| **1996-97** | 3.564399977 | 0.111787 | 362.8104 | 1,102,234 |
| **1997-98** | 3.57860836 | 0.112843 | 367.1302 | 1,128,928 |
| **1998-99** | 3.594499328 | 0.113898 | 371.4106 | 1,160,415 |
| **1999-00** | 3.616031499 | 0.114951 | 375.664 | 1,207,349 |
| **2000-01** | 3.628720999 | 0.116004 | 379.8985 | 1,230,432 |
| **2001-02** | 3.646381784 | 0.117057 | 384.1194 | 1,267,067 |
| **2002-03** | 3.667152412 | 0.118109 | 388.3304 | 1,312,188 |
| **2003-04** | 3.683328091 | 0.11916 | 392.5341 | 1,344,900 |
| **2004-05** | 3.70062526 | 0.120212 | 396.7323 | 1,380,684 |
| **2005-06** | 3.712871798 | 0.121263 | 400.9263 | 1,402,806 |
| **2006-07** | 3.726100913 | 0.122314 | 405.1171 | 1,427,609 |
| **2007-08** | 3.740850387 | 0.123365 | 409.3054 | 1,456,547 |
| **2008-09** | 3.739889342 | 0.124416 | 413.4918 | 1,442,921 |

Continued steady growth is apparent but until the data is transformed back to its exponential it is difficult to see how much growth would have occurred under a counterfactual scenario. Before carrying out the transference the model is run for a privatised industry. This data will show what should have occurred under a privatised industry. It is here that we can see how much growth has occurred over and above that which can be explained by privatisation.

*For the Privatised Industry:*

$$\boldsymbol{ln(n)PKm = \alpha + b(n)Rev + c(n)TKm + d(n)GDP + e(n)PE + f(n)Hat + f(n)Recession/Strikes}$$

Where the PE dummy variable begins in 1992/93 and ends in 2005/06 and where the Hatfield dummy variable begins in 2000/01 and ends in 2006/07 and the Recession/Strike dummy variable is included in 1982/83 and 1991/92. This equates to:

$$\boldsymbol{ln(n)PKm = 2.923 - 5.69(n)Rev + 0.0024(n)TKm + 3.69E - 7(n)GDP + -0.092(n)PE + -0.051(n)Hat + -0.063(n)Recession/Strikes}$$

Table 5-10 gives the predicted forecasts for PKm using the actual data available for the other variables.

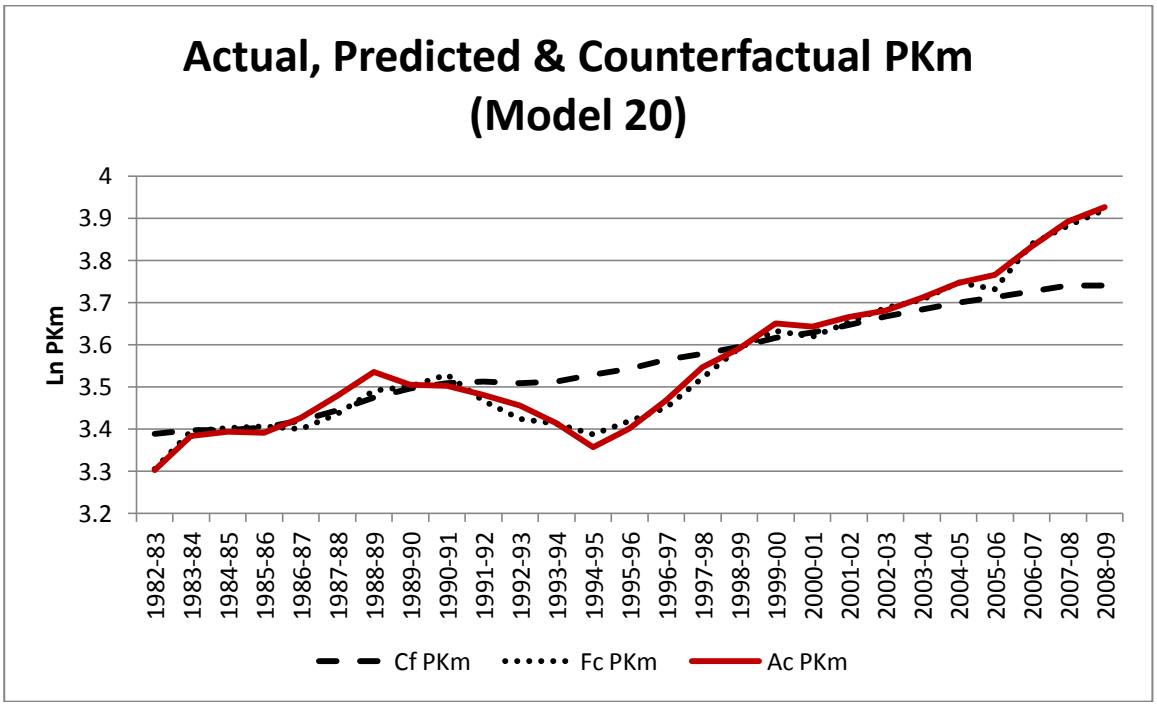
**Table 5-10 Actual Privatised Industry Forecasts for PKm**

| Date | Fc PKm | Ac RevPKm | Ac TKm | Ac GDP | PEffect | Hatfield | Rec/Str |
|---|---|---|---|---|---|---|---|
| **1992-93** | 3.424947 | 0.10530954 | 348.9 | 964,224 | 1 | 0 | 0 |
| **1993-94** | 3.412949 | 0.11034622 | 350.2 | 1,000,920 | 1 | 0 | 0 |
| **1994-95** | 3.387889 | 0.11271045 | 340.5 | 1,032,551 | 1 | 0 | 0 |
| **1995-96** | 3.419036 | 0.114192 | 353.4 | 1,055,903 | 1 | 0 | 0 |
| **1996-97** | 3.450723 | 0.11301963 | 356.7 | 1,102,234 | 1 | 0 | 0 |
| **1997-98** | 3.521587 | 0.11056369 | 376.3 | 1,128,928 | 1 | 0 | 0 |
| **1998-99** | 3.592291 | 0.11232727 | 405.1 | 1,160,415 | 1 | 0 | 0 |
| **1999-00** | 3.633578 | 0.11372468 | 418.4 | 1,207,349 | 1 | 0 | 0 |
| **2000-01** | 3.618755 | 0.11257539 | 427.2 | 1,230,432 | 1 | 1 | 0 |
| **2001-02** | 3.653471 | 0.11251969 | 435.9 | 1,267,067 | 1 | 1 | 0 |
| **2002-03** | 3.687618 | 0.11256574 | 443.3 | 1,312,188 | 1 | 1 | 0 |
| **2003-04** | 3.706755 | 0.11254719 | 446.2 | 1,344,900 | 1 | 1 | 0 |
| **2004-05** | 3.747937 | 0.11277594 | 458.4 | 1,380,684 | 1 | 1 | 0 |
| **2005-06** | 3.731359 | 0.11645346 | 456.81 | 1,402,806 | 1 | 1 | 0 |
| **2006-07** | 3.839092 | 0.11711495 | 461.12 | 1,427,609 | 0 | 1 | 0 |
| **2007-08** | 3.882535 | 0.11787323 | 455.32 | 1,456,547 | 0 | 0 | 0 |
| **2008-09** | 3.920338 | 0.11842739 | 474.48 | 1,442,921 | 0 | 0 | 0 |

Source: Generated by Model

An increase over and above that seen in the counterfactual scenario is apparent except for the early years of privatisation. Figure 5-7 shows the comparison graphically.

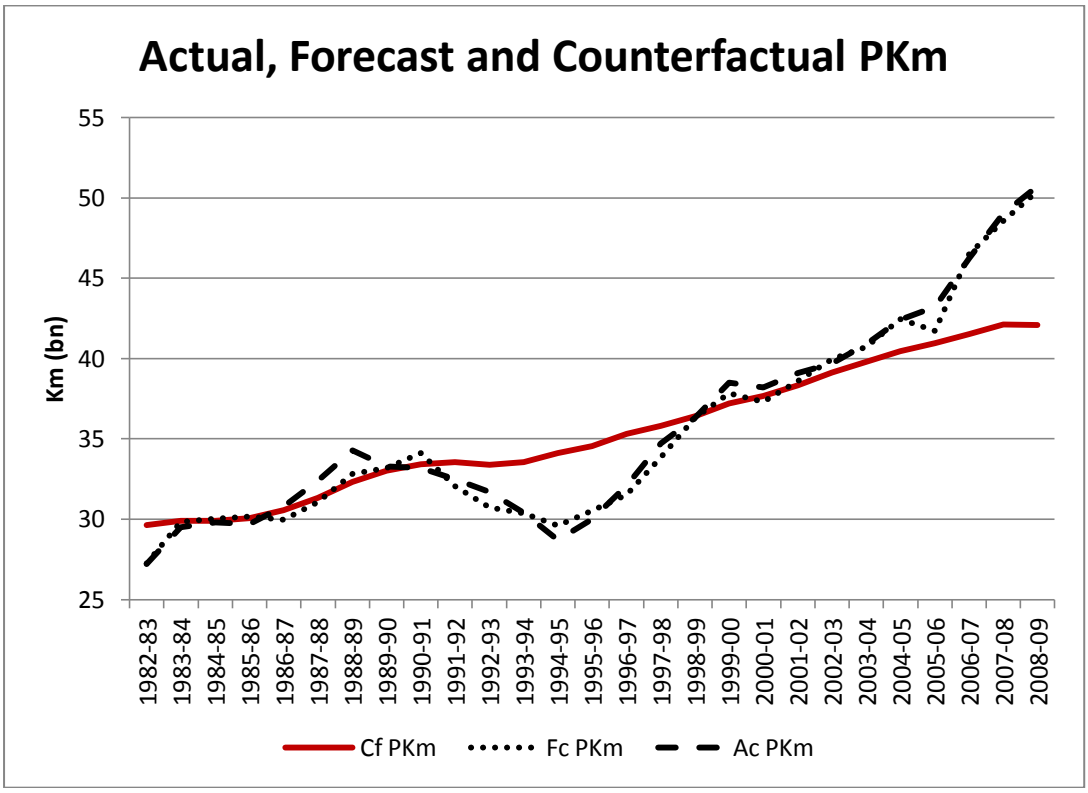
**Figure 5-7 Actual, Predicted and Counterfactual lnPKm**




In the counterfactual scenario the predicted PKm (CfPKm) continues to rise steadily, and due to the fall in actual PKm after 1992, the CfPKm remains above the actual and then, due to the Hatfield crash, it is again slightly above the actual PKm until 2005. The predictions for PKm, based on the actual data and using the model, show that FcPKm follows the actual trends that have occurred.

Now the LnPKm for each scenario has been calculated, the variables can be converted back to kilometres and the differences between each case can be measured. This is then shown pictorially in Figure 5-8. The recession of the early 1990s is clearly shown in the actual PKm (Figure 5-8). But if privatisation had not occurred it is calculated that the fall in PKm would have been steeper but recovery would have occurred earlier. The gradual rise in Pkm from this time onwards in the counterfactual describes an industry where little growth has occurred but it does not show an industry in decline.

**Figure 5-8 The Forecast, Counterfactual and Actual PKm**




An interesting feature of this graph is the picture that has developed after 2005/06. The privatisation effect was removed after this date and passenger kilometres are seen to have risen considerably. In contrast, the counterfactual scenario shows an industry that had stabilised and the passenger kilometres were showing little growth. This suggests that the effect of privatisation is only impacting on the industry in recent years and that the actual passenger kilometre rise that has been seen was going to have happened anyway. This slight depression could also indicate an anomaly in the data or a missing variable to explain the event. That said, the model does closely follow the actual PKm trends and should therefore be seen as an effective explanation of events.

In essence, it can be seen from the model that the dummy variables indicate that privatisation suppressed demand between 1992/3 and 2005/6 by around 8.8% (1 – exp θ) whilst the Hatfield accident suppressed demand between 2000/1 and 2006/7 by a further 5.0% (1 – exp μ). The strikes in the years 1992/3 (ASLEF) and 1991/2 (Signalmen) were estimated to reduce demand by around 6.1% (1 – exp ρ). This is broadly in line with the findings by Whelan et al. (2010) although this research included a PE variable as well as various other dummy variables to account for events.

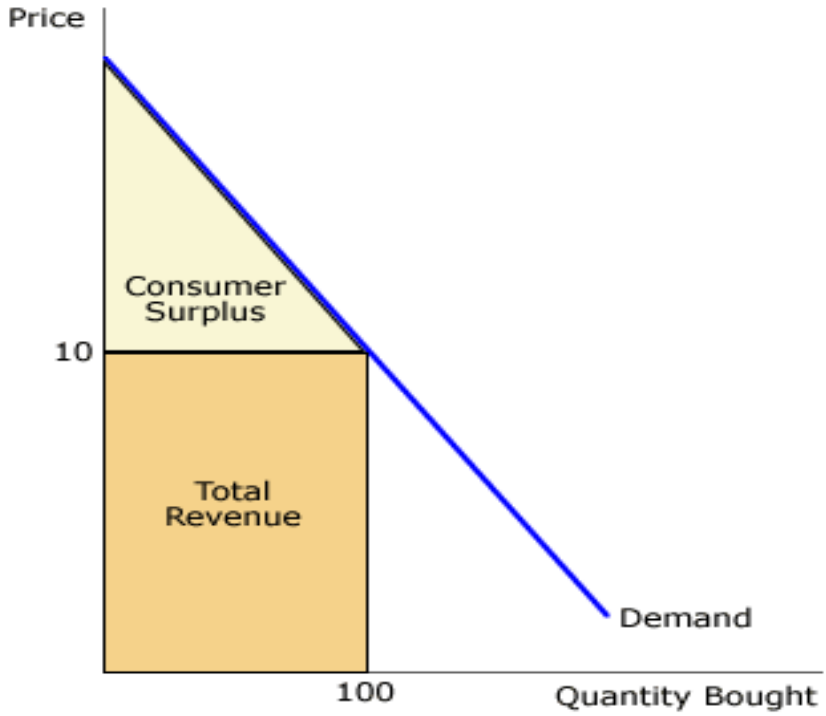
This analysis suggests that rather than a three phase initiative of pre-privatisation, transition, and post privatisation, as suggested by Smith (2006), there are at least four periods to the 'privatisation' era. The first, 1992 to 1995, was the preparatory phase. The second from 1995 to 2000 was the initial privatisation phase, in which OPRAF and Railtrack are key players. The third, from 2000 to 2005, is the Hatfield phase in which OPRAF is replaced by SRA and Railtrack by Network Rail. The fourth phase is the post Hatfield phase, commencing in 2005, associated with greater control of the railways by DfT. This does not sit with the political timeframe as the Conservative Government under John Major ran from 1990 until May 1997 and then became a Labour Government under Tony Blair (later Gordon Brown) until the end of the research period. It does, however, follow the various policy changes and reorganisations that took place within the industry and highlights how external impacts can be both a driver and suppressor. The difference of opinion compared to Smiths findings could be due to the inclusion of the benefits in this research rather than just accounting for trends in the costs.

The modelling of the data has shown some interesting issues around timescales of policy issues, impacts of events, strength of internal and external impacts as well as giving a good idea of the different scenarios that occurred, should have occurred, and would have occurred under a non-privatised industry. It is now the intention to take this data a step further and start to account for the different costs and benefits that have been felt by the different stakeholders. The next section starts this process by calculating the consumer surplus that has arisen since privatisation and allocates this to the stakeholder groups.

## 5.7 Calculating the Consumer Surplus

The consumer surplus will determine how much of the growth in PKm can be attributed to the privatisation and how much would have happened anyway. Consumer Surplus is defined as the difference between the price a customer is willing to pay for a product and the price that he actually ends up paying (Figure 5-9). If more people are prepared to pay a higher amount than that which is demanded to cover the cost there will be a consumer surplus.

**Figure 5-9 Consumer Surplus**




Source: (Parkin and King, 1992)

For this research the consumer surplus is looking at the change between the counterfactual scenario, the predicted scenario and the actual scenario. The model that has been developed has given the passenger kilometres that would have been demanded if the industry had not been privatised and the predicted demand based on a privatised industry. The difference between these figures is the change in demand. The amount of passenger kilometres over and above that which is predicted is considered to be the consumer demand surplus and can be converted to revenue to calculate the amount of benefit that privatisation has brought to the main stakeholders.

The first step is to measure the increase in percentage terms for each scenario from the base line (1994/95). The percentage increases show how much increase each scenario generated over and above the base line. It does not yet attribute the increase to anything other than what would, and did, happen. Calculating the change in growth can be made using the following model:

$$\text{Change in PKm} = \frac{\mathbf{A1-A0}}{\mathbf{A0}}$$

**Where A1 = each year from 1994/95 and A0 = the base year 1994/95**

The same is carried out for both the counterfactual years and the forecast years where:

**C1 = each counterfactual year, C0 = the counterfactual base year (1994/95) and**

**F1 = each forecast year, F0 = the forecast base year (1994/95)**

It is worth remembering here that we look at the difference in the counterfactual and the forecast rather than the counterfactual and the actual. This is because the aim is to find how much of the growth is due to privatisation and anything over and above this will be due to other factors unconnected to privatisation. Table 5-11 gives the amount of passenger kilometres for the actual data, predicted privatised data and counterfactual scenario and the growth that has occurred from the base year in percentage terms.

**Table 5-11 Growth in PKm for each scenario**

| | AcPKm | FcPKm | CfPKm | Ac% | Fc% | Cf% |
|---|---|---|---|---|---|---|
| **1994-95** | 28.70 | 29.60 | 34.11 | 0% | 0% | 0% |
| **1995-96** | 30.00 | 30.54 | 34.56 | 4.53% | 3.16% | 1.34% |
| **1996-97** | 32.10 | 31.52 | 35.32 | 11.85% | 6.48% | 3.55% |
| **1997-98** | 34.70 | 33.84 | 35.82 | 20.91% | 14.30% | 5.03% |
| **1998-99** | 36.30 | 36.32 | 36.40 | 26.48% | 22.68% | 6.71% |
| **1999-00** | 38.50 | 37.85 | 37.19 | 34.15% | 27.85% | 9.04% |
| **2000-01** | 38.20 | 37.29 | 37.66 | 33.10% | 25.97% | 10.43% |
| **2001-02** | 39.10 | 38.61 | 38.34 | 36.24% | 30.42% | 12.40% |
| **2002-03** | 39.70 | 39.95 | 39.14 | 38.33% | 34.95% | 14.76% |
| **2003-04** | 40.90 | 40.72 | 39.78 | 42.51% | 37.56% | 16.63% |
| **2004-05** | 42.40 | 42.43 | 40.47 | 47.74% | 43.34% | 18.66% |
| **2005-06** | 43.21 | 41.74 | 40.97 | 50.56% | 40.98% | 20.12% |
| **2006-07** | 46.22 | 46.48 | 41.52 | 61.04% | 57.02% | 21.72% |
| **2007-08** | 49.01 | 48.55 | 42.13 | 70.76% | 63.99% | 23.53% |
| **2008-09** | 50.70 | 50.42 | 42.09 | 76.65% | 70.31% | 23.41% |

The actual growth is slightly more than the growth predicted but considerably more than the growth under the counterfactual scenario. The differences between the scenarios can now be measured. This will give us the consumer surplus.

The complete calculation that has been used to determine the differences between the growth that has actually occurred and the growth that would have occurred anyway can now be measured, therefore –

$$\boldsymbol{Change\ in\ PKm} = \left(\frac{\boldsymbol{A1} - \boldsymbol{A0}}{\boldsymbol{A0}}\right) \times \boldsymbol{A0} \left[\frac{\left(\frac{\boldsymbol{F1} - \boldsymbol{F0}}{\boldsymbol{F0}}\right) - \left(\frac{\boldsymbol{C1} - \boldsymbol{C0}}{\boldsymbol{C0}}\right)}{\left(\frac{\boldsymbol{F1} - \boldsymbol{F0}}{\boldsymbol{F0}}\right)}\right]$$

This will give us the change in PKm which can then be divided by the Revenue PKm Unstandardised Coefficient B for Model 20 for each year since 1994/95 to calculate the change in consumer surplus. Using the model:

$$\Delta \boldsymbol{CS} = \frac{\Delta \boldsymbol{PKM_n}}{\boldsymbol{5.69}}\ \boldsymbol{x\ 1,000,000,000}$$

Where:

**ΔCS = Change in Consumer Surplus and:**

**$\Delta PKM_{(n)}$ = (A1 – A0) x (1 - Growth that would have occurred anyway) and:**

**5.69 = Model 20 RevPKm Unstandardised Coefficient B.**

Table 5-12 shows the changes in percentage growth that can be attributed to privatisation. The third column gives the actual increase in PKm and then the fourth column shows the fare parameters in pence per Km that can be attributed to privatisation in the form of consumer surplus. The data set starts at 1995 as this is the actual start of privatisation and any surplus prior to this, although may be due to the privatisation initiative, was gained while the rail industry was still under nationalised management structure.

**Table 5-12 Consumer Surplus**

| | Privatisation Effect | Growth due to Privatisation | Actual Increase in PKm (Bil) | Change in Consumer Surplus (£bil) |
|---|---|---|---|---|
| **1995-96** | 57.68% | 0.026125222 | 0.749793883 | 0.131773969 |
| **1996-97** | 45.26% | 0.053617272 | 1.538815702 | 0.270442127 |
| **1997-98** | 64.83% | 0.135522662 | 3.889500403 | 0.683567733 |
| **1998-99** | 70.40% | 0.186412576 | 5.350040942 | 0.940253241 |
| **1999-00** | 67.55% | 0.230666086 | 6.620116659 | 1.163465142 |
| **2000-01** | 59.84% | 0.198076132 | 5.684784999 | 0.99908348 |
| **2001-02** | 59.25% | 0.214690717 | 6.16162359 | 1.082886395 |
| **2002-03** | 57.78% | 0.221454664 | 6.355748843 | 1.117003312 |
| **2003-04** | 55.73% | 0.236892092 | 6.79880303 | 1.194868722 |
| **2004-05** | 56.94% | 0.271805937 | 7.800830403 | 1.370971951 |
| **2005-06** | 50.90% | 0.257332016 | 7.385428861 | 1.297966408 |
| **2006-07** | 61.90% | 0.377845063 | 10.8441533 | 1.905826591 |
| **2007-08** | 63.23% | 0.447377144 | 12.83972403 | 2.256542009 |
| **2008-09** | 66.70% | 0.511231709 | 14.67235006 | 2.578620396 |
| **Total** | | | | 16.99327148 |

The total change in consumer surplus over the privatisation period stands at £16.993 (bn). This has to be discounted to account for net present value. Using the Government recommended rate of 3.5% NPV it can be said that the consumer surplus that can be attributed to the privatisation initiative stands at **£12.3422 (bn)** and that the privatisation of the rail industry generated a consumer benefit. It can, therefore, be said that there has been a significant benefit to consumers – rail users – from the privatisation initiative. This is unsurprising when you consider that a counterfactual scenario was looking to increased fares and a stagnated service whereas a privatised industry has seen a considerable increase in the quantity of service and in many instances quality (PPM has risen over the period). The first stage of the cost benefit analysis can therefore suggest that the privatisation initiative has generated a benefit of more than £12 bn to the User stakeholder group.

This is just the first stage of the process though; there are other stakeholders that need to be assessed for costs and benefits. The next section looks at the operators of the railways and calculates the change in revenue. This is carried out in much the same way as the consumer surplus has been and is the subject of the next section.

### 5.7.1 Change in Revenue

To calculate the change in revenue we substitute in the previous model the following:

**F is based on the forecast PKm times the actual RevPKm,**

**C is based on the counterfactual PKm times the counterfactual RevPKm.**

$$\boldsymbol{Change\ in\ Rev} = \left(\frac{\boldsymbol{A1}-\boldsymbol{A0}}{\boldsymbol{A0}}\right)\left[\frac{\left(\frac{\boldsymbol{F1}-\boldsymbol{F0}}{\boldsymbol{F0}}\right)-\left(\frac{\boldsymbol{C1}-\boldsymbol{C0}}{\boldsymbol{C0}}\right)}{\left(\frac{\boldsymbol{F1}-\boldsymbol{F0}}{\boldsymbol{F0}}\right)}\right]$$

Whereas the consumer surplus looked at how much extra consumers were prepared to pay, the change in revenue shows how much extra – or less – the passengers actually pay for the service that they receive. This will determine the increase in revenue to the operators and will highlight the amount of cost or benefit to the Operator stakeholder group.

The first stage is to calculate each bracket of the equation shown above to give the change in revenue for the three scenarios. The results as shown in Table 5-13

**Table 5-13 Actual, Counterfactual and Forecast Revenue (£bn)**

| | AcRev | PfRev | CfRev |
|---|---|---|---|
| **1992-93** | 3.338313 | 3.235217 | 3.4013104 |
| **1993-94** | 3.354525 | 3.34952 | 3.36442362 |
| **1994-95** | 3.23479 | 3.336611 | 3.43046792 |
| **1995-96** | 3.42576 | 3.487418 | 3.49015525 |
| **1996-97** | 3.62793 | 3.562736 | 3.54590938 |
| **1997-98** | 3.83656 | 3.741264 | 3.599174 |
| **1998-99** | 4.07748 | 4.079409 | 3.65084108 |
| **1999-00** | 4.3784 | 4.304253 | 3.70147946 |
| **2000-01** | 4.30038 | 4.198063 | 3.75146219 |
| **2001-02** | 4.39952 | 4.344208 | 3.80104002 |
| **2002-03** | 4.46886 | 4.496955 | 3.85038521 |
| **2003-04** | 4.60318 | 4.583083 | 3.89961844 |
| **2004-05** | 4.7817 | 4.785474 | 3.9488258 |
| **2005-06** | 5.032031 | 4.860277 | 3.99806967 |
| **2006-07** | 5.41287 | 5.443881 | 4.04739592 |
| **2007-08** | 5.776701 | 5.722408 | 4.09683875 |
| **2008-09** | 6.004012 | 5.970811 | 4.14642393 |

Once this has been completed the actual equation itself is calculated to give the change in revenue and subsequent cost or benefit that has been felt by the operators due to the privatisation initiative. The change in revenue can is shown in Table 5-14.

**Table 5-14 Change in Revenue**

| | Actual | Counterfactual | Forecast | Change in Revenue | NPV 3.5% |
|---|---|---|---|---|---|
| **1994-95** | | | | | |
| **1995-96** | 0.059036 | 0.017399181 | 0.045198 | 0.036309874 | |
| **1996-97** | 0.121535 | 0.033651811 | 0.067771 | 0.061186417 | |
| **1997-98** | 0.186031 | 0.049178738 | 0.121277 | 0.110593539 | |
| **1998-99** | 0.260508 | 0.06423997 | 0.222621 | 0.185335457 | |
| **1999-00** | 0.353535 | 0.079001333 | 0.290007 | 0.257227667 | |
| **2000-01** | 0.329416 | 0.093571572 | 0.258182 | 0.210026987 | |
| **2001-02** | 0.360064 | 0.108023778 | 0.301982 | 0.231263209 | |
| **2002-03** | 0.381499 | 0.122408166 | 0.347761 | 0.247215686 | |
| **2003-04** | 0.423023 | 0.13675992 | 0.373574 | 0.268160598 | |
| **2004-05** | 0.47821 | 0.151104133 | 0.434232 | 0.311802629 | |
| **2005-06** | 0.555597 | 0.165458988 | 0.456651 | 0.354287019 | |
| **2006-07** | 0.67333 | 0.179837859 | 0.63156 | 0.48159782 | |
| **2007-08** | 0.785804 | 0.19425071 | 0.715036 | 0.572327953 | |
| **2008-09** | 0.856075 | 0.20870506 | 0.789484 | 0.629765912 | |
| **Total** | | | | £3.957100(bn) | £2.84(bn) |

The total change in revenue is **£3.957 (bn)** and is a positive increase therefore a benefit rather than a cost. The change in revenue should also be converted using the Governments recommended NPV 3.5% before comparing in the final cost benefit analysis in the next chapter.

**This gives a change in revenue of £2.84bn**

The consumer surplus far outweighs the change in revenue that has been seen. More passengers have travelled which has increased the amount of revenue but because the price has been kept low the actual revenue received per passenger kilometre has reduced. The interesting result here is that the forecast always underestimate the actual total revenue increases. This may be because the model doesn't take into account price discrimination – it assumes a standard fare per km is charged. It could be argued that as a result one of the benefits of privatisation is missed (private firms are better at maximising revenue yield). In six of the years the actual revenue is greater than the counterfactual revenue increase.

## 5.8 Conclusion

The preparation and development of defining the benefits of the privatisation policy initiative have been rigorously considered and the arguments for choosing the variables and methodology relate to the previous research that has been carried out by others. The calculation for the benefits to consumers and operators is sound and suggests that consumers have benefited far in excess of the train operating companies. The reasons given to underpin this finding are situated within the regulatory framework that has developed during privatisation. We will see in the next chapter how the operators have held their own when it comes to achieving profits despite the continued tightening of the franchise contracts and deliverables demanded by the DfT.

It is also worth noting at this point that the findings for the consumer surplus and the change in revenue are only as good as the counterfactual that has been devised. It is not a definitive figure and does not represent the actual monetary benefit that has actually occurred. It does, however, represent the total amount of benefit in monetary terms that has been felt, by the consumers and operators, if the counterfactual scenario that has been devised is a correct assumption of what would have happened if privatisation had not occurred.

Many consumers will argue that the loss of restaurant cars, manned stations, guards vans and other costly and loss making or capacity reducing measures, along with the increased opportunity fares and confusion around the multitude of differing fares and ticket structure, has not amounted to more than £12 (bn) of savings/benefits. It should therefore be highlighted that this perceived increase in benefit is compared to what would have been felt under a nationalised railway that was run according to the constraints of a Treasury funded industry.

One of the issues with estimating the benefits was around the fare structure, or revenue per passenger kilometre. Profits are made, and conversely benefits are felt, on different routes to different degrees. The only way of using revenue as a guide to price and income was through the generalised revenue per passenger kilometre data and this does not give a comprehensive account of where the benefits have been felt the most. Disaggregating the data by sector or ticket type would have helped to identify and allocate more proficiently but not all data is collected in this manner and therefore a direct disaggregation of parts was not possible. Whelan (2010) also found this when looking at modelling long time series data and also pointed out that seasonality is also a feature. Whelan suggests that the volatility can be

reduced through estimation of the underlying trend (Whelan et al. 2010) and this is something that can be considered as additional research to the model developed here.

The benefits to consumers and operators are now ready to be included in the final cost benefit table that will quantify the total costs and benefits of the privatisation policy initiative to all stakeholders. Before this can occur the actual and counterfactual costs of the privatisation policy have to be calculated and this is the topic of the next chapter.

# 6 Costs of the Railway Industry

## 6.1 Introduction

The previous chapter looked at the user and operator benefits by way of calculating the consumer surplus and change in revenue. This tells us how much user benefit has been generated over and above that which would have been expected and would have happened anyway. It does not tell us how much of a welfare benefit this is or where the costs have been felt the most.

In order to ascertain the impact of privatisation we must include the costs of the privatisation initiative to the industry. The difficulties in collecting cost data has already been discussed and will be further investigated in this chapter. To achieve the aims of this research the cost of the actual privatisation process should be accounted for and this will also include the income generated from the sale of the different companies. The actual operational costs include investment and subsidies although the subsidy is a benefit to the operators and Network Rail, it is a cost to the Government. Collecting data for the costs – where the data was obtained, the format and extrapolation needed, and the assumptions that needed to be made - are described first followed by an explanation of the costs and the calculation of welfare benefit.

### 6.1.1 Collecting Data for the Costs

Calculating the cost of running the rail industry both before and after privatisation has been a difficult process. The data has been found to be elusive in some areas and, where it is available, the format that has been used for collection and reporting has not been consistent over the time period of the research. The majority of the cost data for the period after privatisation has been kindly given by Andrew Smith (Smith, 2006). Smith has devised a specific cost methodology to ascertain the total costs since privatisation and then the disaggregated costs for the different stakeholders. Smith uses **Total Cash Costs** as the basis for the data collection and, where relevant, the operating grants (such as level crossing grants) and capital grants (such as regional development grants) have been added back into operating and capital costs in order to construct measures of gross costs (Smith, 2006). Achieving the same methodology as Smith was not without difficulty as Smith's data does not go beyond the Hatfield incident and changes that took place in reorganising the industry structure and responsibility for the different activities. Nevertheless, attempts were made to ensure that

the data separation and aggregation was consistent with the methodology based on the knowledge that was available.

The costs prior to privatisation have also been collected and the same methodology used to throughout the entire research time frame. The Retail Price Index used for the benefit section (RPI from The Office of National Statistics) has also been used for the costs and to ensure consistency the data received from Andrew Smith has been taken back to original prices and then recalculated using the RPI index from the Office for National Statistics (Figure 6-1).

**Figure 6-1 RPI Calculation**

| | | |
|---|---|---|
| **2005 prices = x** | **original prices = y** | **RPI = z** |
| **therefore:** | **y * z = x** | |
| | **z = x / y** | |
| | **z = RPI increase** | |

**The RPI used for changing the data was 106 = 2005/06 prices**

This ensures consistency throughout the data series and the whole research. The RPI 2008 prices mean that all data for the 2008/09 period are real prices that are also current prices and therefore do not need adjusting. Although this process was time consuming and open to marginal error it does mean that any calculations made using the cost and benefit currency data will be directly comparable if compared to any other data compiled elsewhere in this research.

Infrastructure expenditure has been calculated from the Annual Returns for maintenance and renewals/enhancements and other operating costs taken from the NR Accounts (minus maintenance costs). Data was recalculated where necessary into 2008 prices for each column rather than totalling and then recalculating; therefore, all totals are the sum of the recalculated 2008 price data. The current prices for 2008/09 have been taken from the National Rail Trends and the Network Rail Annual Accounts. Train operating data is from the TOC Annual Accounts and Office of the Rail Regulator (ORR). An example of how the data was calculated for the individual years and variable type is shown below:

*TOC costs = OPEX+CAPEX for train operations therefore for 2008/09 the total costs for TOCs was: OPEX £8182.22m + CAPEX £173.200m = £8355.42. No price change needs to be made as this is the price year used (ORR 2009a).*

*Total TOC data = OPEX + CAPEX – Access Charges. Access Charges paid during 2008/09 were £1,976m therefore Total TOC Costs = £6,379.42. (ORR 2009a)*

This total is slightly higher than anticipated and could account for the reduction in access charges paid and the rebate received:

*"Franchised track access income was £0.4 billion lower than assumed in the Access Charging Regime (ACR) 2003. This is due to the net effect of a £0.6 billion rebate of track access charges to train operators offset by £0.2 billion higher income than assumed in the ACR2003 as a result of outperformance of the schedule 8 regime and higher income from the usage charge and traction electricity charge[20]"* (ORR 2009a).

Costs attributed by different stakeholders in one year and offset by others in other years is a problem for consistency of comparison with the benefits although should not affect the final totals. This also highlights the continually changing policy for rail expenditure and the problem of using the Control Periods as indications of where costs are attributed. Changes in Government, policy, general economy, and additional events outside of the rail industry, have all played a part in altering the allocated fund amounts and specific direction.

In 1994/95 the first payments of 'access charges' were made to Railtrack from the general operating budget. The operating expenditure therefore includes access charges from this year onwards.

*"At 2008 prices the operating expenditure for 1994/95 was £3,501.9mil and access charges were £3,231.214mil"* (ORR 2009a).

The breakdown of costs for the years prior to privatisation has not been easy to find although using a cash-based method for the total costs has made the collection simpler. There was a change in accounting procedures in 1985 when calculations for the year moved from calendar year to financial year. The data for 1985 was therefore given in the Annual Accounts for a 15month period. Adjustments have been made by BR for this event and the figures used are

[20] Network Rail's regulatory accounts, ACR2003 and Network Rail business plan 2007 as shown in the Annual Assessment of NR 2008/09

the adjusted figures that cover a 12 month period. The accounting data for 1984-1986 were affected by the national coal strike. As this affected many industries, and also the general consumer, the impact is difficult to build into the accounting results. The data for 1986-1989 were also affected by the sale of many BR businesses. This will have had an impact on the number of employees (approximately 13,000 according to Smith 2002) and also the BR cost base. The trend for BR business sell offs started in the early 1980's and gives rise to the question of whether it is possible to compare the costs of British Rail against the privatised industry (Smith, 2006). To this end, careful consideration has been given to the data that has been collected, and the parameters that this data is then used in the analysis, as it is important that double accounting does not occur and the transition costs and sale of BR companies appear only once in the totals rather than throughout the timeframe.

The Company Accounts for British Rail were requested from 1979-1995 and these were used to underpin the data that was already in the data collection table, to fill in any gaps that were proving difficult to fill, and to ensure that the data collection was as rigorous as possible by comparing data collected from other sources. The accounts also came with their own set of difficulties. The methodology of reporting used in the accounts has also changed over the years and the breakdowns of costs and to whom they are attributed seemed to vary. This will mean that in order to have a continuous timeline of disaggregated costs certain assumptions will have to be made where the data is not available in the format needed. Where this is applicable a description of the assumptions and method of calculation will be given. It was considered whether in some instances leaving gaps in the data set would be preferable to the inclusion of estimated data but the inability of using a completed timeline would render the exercise less rigorous than any estimation made based on real events.

Although the majority of data prior to privatisation has been taken from the BR resource accounts and the RPI adjusted to 2008 prices, in some instances, the data for investment has been taken from Gourvish (2002). Calculating investment – capital expenditure (CAPEX) – from the annual accounts has proven difficult and it has been necessary to compare costs to the data collected by Gourvish and, where comparisons are favourable, gaps have been filled using this data. For certain years, where the breakdown has not included a specific column but where total costs are known and data for either OPEX or CAPEX is known, the total for the missing data has been calculated from the totals. The following two tables (Table 6-1 & Table 6-2) give the rail costs in 2008 prices from 1979 to 2009 and highlights where data has been altered or calculated as well as the source of the data.

**Table 6-1 Infrastructure Operating Costs for the Rail Industry 1979-2009 (2008 prices)**

| | Maintenance | Renewals and Enhancements | Other Operating | Total Operating Costs |
|---|---|---|---|---|
| **1979/80**[21] | 1918.877 | 871.7 | 1309.066 | **4099.643**[22] |
| **1980/81** | 1909.308 | 879.54 | 1292.988 | **4081.836** |
| **1981/82** | 1834.217 | 797.86 | 1447.054 | **4079.131** |
| **1982/83** | 1812.07 | 651.9 | 1450.08 | **3914.05** |
| **1983/84** | 1759.362 | 827.31 | 1424.137 | **4010.809** |
| **1984/85**[23] | 2468.804 | 836.27 | 1914.986 | **5220.06** |
| **1985/86** | 1978.078 | 910.27[24] | 1039.66 | **3928.008** |
| **1986/87** | 1983.96 | 897.6 | 950.4 | **3831.96** |
| **1987/88** | 1977.282 | 1084.54 | 1101.42 | **4163.242** |
| **1988/89**[25] | 1458.858 | 984.9 | 932.64 | **3376.398** |
| **1989/90** | 387.438 | 1052.76 | 1169.94 | **2610.138** |
| **1990/91** | 1687.68 | 929.9 | 1128.8[26] | **3746.38** |
| **1991/92** | 1309.128 | 948.29 | 1304.1 | **3561.518** |
| **1992/93** | 1391.068 | 787.4 | 1489.55 | **3668.018** |
| **1993/94** | 1679.12 | 664.02 | 1260.72 | **3603.86** |
| **1994/95** | 896.749 | 725.63 | 1068.33 | **2690.709** |
| **1995/96** | 1142.224[27] | 1122.996 | 1039.75 | **3304.97** |
| **1996/97**[28] | 1023.767 | 1424.189 | 923.8777 | **3371.833** |
| **1997/98** | 952.5123 | 1694.977 | 905.9883 | **3553.478** |
| **1998/99** | 918.7511 | 1912.885 | 930.6618 | **3762.298** |
| **1999/00** | 856.8336 | 2177.134 | 934.4613 | **3968.429** |
| **2000/01** | 901.968 | 3079.697 | 963.4717 | **4945.137** |
| **2001/02** | 1180.004 | 3518.962 | 1365.199 | **6064.164** |
| **2002/03** | 1438.573 | 3847.941 | 1461.492 | **6748.006** |
| **2003/04** | 1475.794 | 4710.687 | 1551.949 | **7738.431** |
| **2004/05** | 1460.971 | 4007.038 | 1418.441 | **6886.45** |
| **2005/06** | 1338.4 | 3523.52 | 1384.32 | **6246.24** |
| **2006/07** | 1252.215 | 3656.226 | 1273.574 | **6182.015** |

[21] Operating Costs for the first five years of the research were taken from BR accounts and recalculated into 2008 prices

[22] Rolling stock data from DfT NRT has been subtracted from the BR Annual Accounting data to give these totals as the original accounts include this as a CAPEX for the dates 1979-1984

[23] Although adjusted for change in accounting procedures the effect of the coal strike is evident

[24] Renewals from this point until 1997 have been taken from Gourvish 2002 and recalculated into 2008 prices

[25] Data for 1988-1990 has been reallocated according to cost provision between TOC costs and NR costs. Train provision has been identified as rolling stock costs, train maintenance is a TOC cost and terminal maintenance adjusted to cover both TOC and NR.

[26] From 1990-1995 'other operating costs' are calculated by taking the maintenance and renewal costs from the total costs as no exact data is available

[27] Although the total amount for this year has been calculated from the actual accounts the breakdown was not available. Therefore this year's breakdown has been extrapolated from the total using an average of the previous two and future two years

[28] Data from this date forward until 2007 has been given with the kind permission of Andrew Smith

| | | | | |
|---|---|---|---|---|
| **2007/08**[29] | 1191.824 | 4228.949 | 1209.896 | **6630.669** |
| **2008/09** | 1104 | 4710 | 1360 | **7174** |

**Table 6-2 Passenger Service Costs and Total Industry Costs 1979-2009 (2008 prices)**

| | **TOC-own operating costs** | **Rolling stock CAPEX**[30] | **Total Passenger Service Costs** | **TOTAL INDUSTRY COSTS** |
|---|---|---|---|---|
| **1979/80** | 2706.818 | 352.47 | **3059.288** | **7158.931** |
| **1980/81** | 2739.735 | 401.25 | **3140.985** | **7222.821** |
| **1981/82** | 2717.029 | 312.83 | **3029.859** | **7108.99** |
| **1982/83** | 2502.13 | 270.3 | **2772.43** | **6686.48** |
| **1983/84** | 2669.909 | 164.45 | **2834.359** | **6845.168** |
| **1984/85** | 3122.878 | 142.19 | **3265.068** | **8485.128** |
| **1985/86** | 2428.9 | 181.6 | **2610.5** | **6538.508** |
| **1986/87** | 2282.94 | 178.2 | **2461.14** | **6293.1** |
| **1987/88** | 2724.198 | 217.33 | **2941.528** | **7104.77** |
| **1988/89** | 2786.714 | 418.08 | **3382.683** | **6759.081** |
| **1989/90** | 3531.21 | 435.24 | **4092.001** | **6702.139** |
| **1990/91** | 2402.286 | 559.3 | **2961.586** | **6707.966** |
| **1991/92** | 2818.133 | 729.33 | **3547.463** | **7108.981** |
| **1992/93** | 2908.99 | 832.35 | **3741.34** | **7409.358** |
| **1993/94** | 2232.561 | 645.66 | **2878.221** | **6482.081** |
| **1994/95** | 3231.21[31] | 536.4 | **3767.6** | **6458.309** |
| **1995/96** | 3122.741 | 288 | **3410.741** | **6715.711** |
| **1996/97** | 4009.256 | 70.31106 | **4079.567** | **7451.4** |
| **1997/98** | 3856.389 | 155.0577 | **4011.447** | **7564.924** |
| **1998/99** | 3798.116 | 231.9187 | **4030.035** | **7792.333** |
| **1999/00** | 3799.118 | 307.1094 | **4106.228** | **8074.657** |
| **2000/01** | 4243.469 | 698.2857 | **4941.755** | **9886.891** |
| **2001/02** | 4467.092 | 1143.528 | **5610.62** | **11674.78** |
| **2002/03** | 4851.89 | 691.0885 | **5542.979** | **12290.98** |
| **2003/04** | 5047.138 | 913.0746 | **5960.213** | **13698.64** |
| **2004/05** | 5217.937 | 1031.277 | **6249.215** | **13135.66** |
| **2005/06** | 5434.768 | 624.2342 | **6059.002** | **12305.24** |
| **2006/07** | 4994.736 | 351.9612 | **5346.697** | **11528.71** |
| **2007/08** | 5012.455 | 416.755 | **5429.21** | **12059.88** |
| **2008/09** | 6379.42 | 345.627 | **6725.047** | **13899.05** |

[29] Data from this point has been collected from resource accounts and calculated using Smiths methodology

[30] Rolling Stock data obtained from the DfT National Rail Trends (from various year books recalculated to 2008 prices)

[31] First year of access charges paid

It is immediately apparent from the tables that the cost structure over the 30 year period has altered as the objectives of the railways and the changing policy implications have taken effect. Renewal costs have quadrupled but maintenance costs have seen a reduction. Train operating costs have remained fairly steady prior to privatisation but increased substantially since. Although total industry costs have doubled over the time period it is important to remember that the actual service delivered and amount of passengers now using the railways has also increased substantially.

The next section will look at the data collection in greater detail taking in turn each stakeholder before the final costs are calculated against a counterfactual to find the final welfare cost/benefit of the industry after privatisation.

## 6.2 The Actual and Counterfactual Cost of Running the Infrastructure

Although the costs identify a significant increase in expenditure and suggest an overwhelming disbenefit to the privatisation initiative there needs to be some balance set and an argument put forward to a counterfactual scenario. The counterfactual is calculated in exactly the same way as the counterfactual for the benefits section – forecasting five year centred moving averages. The moving averages are again calculated on a yearly basis across the research period with the start of the impact of the costs and benefits of privatisation again deemed to have started at 1992; therefore, the moving averages only go as far as 1992 and the forecasting begins from there on. The following table (Table 6-3) outlines the expected (counterfactual) cost increases compared with the actual increases for the infrastructure costs.

**Table 6-3 Total Costs and Counterfactual Costs of the Infrastructure**

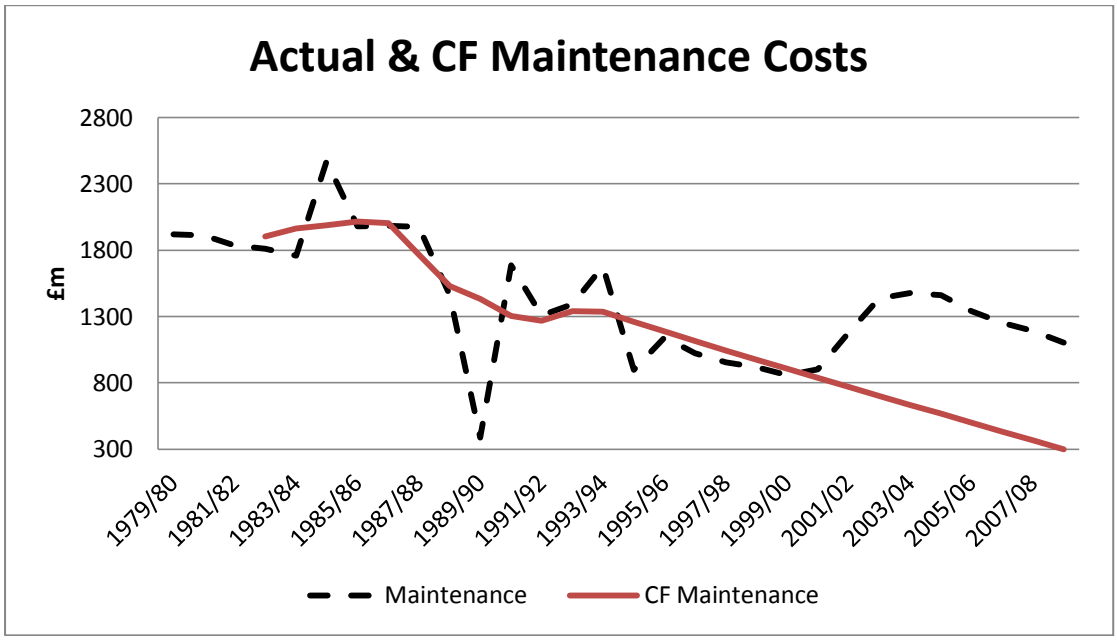
| | Maintenance Costs | Counterfactual Maintenance Costs | Renewals & Enhancements | Counterfactual Renewals & Enhancements | Other Operating Costs | Counterfactual Other Operating Costs | Total Operating Costs | Counterfactual Total Operating Costs |
|---|---|---|---|---|---|---|---|---|
| **1979/80** | 1918.877 | | 871.7 | | 1309.066 | | **4099.643** | |
| **1980/81** | 1909.308 | | 879.54 | | 1292.988 | | **4081.836** | |
| **1981/82** | 1834.217 | | 797.86 | | 1447.054 | | **4079.131** | |
| **1982/83** | 1812.07 | 1901.76 | 651.9 | 802.119 | 1450.08 | 1445.257 | **3914.05** | 4149.136 |
| **1983/84** | 1759.362 | 1963.629 | 827.31 | 801.649 | 1424.137 | 1480.516 | **4010.809** | 4245.794 |
| **1984/85** | 2468.804 | 1985.481 | 836.27 | 814.696 | 1914.986 | 1405.518 | **5220.06** | 4205.695 |
| **1985/86** | 1978.078 | 2016.976 | 910.27 | 867.934 | 1039.66 | 1320.987 | **3928.008** | 4205.897 |
| **1986/87** | 1983.96 | 2003.447 | 897.6 | 926.957 | 950.4 | 1236.971 | **3831.96** | 4167.375 |
| **1987/88** | 1977.282 | 1765.26 | 1084.54 | 964.365 | 1101.42 | 1113.317 | **4163.242** | 3842.941 |
| **1988/89** | 1458.858 | 1528.083 | 984.9 | 987.977 | 932.64 | 1047.726 | **3376.398** | 3563.786 |
| **1989/90** | 387.438 | 1431.56 | 1052.76 | 995.009 | 1169.94 | 1092.01 | **2610.138** | 3518.579 |
| **1990/91** | 1687.68 | 1305.456 | 929.9 | 970.364 | 1128.8 | 1166.193 | **3746.38** | 3442.013 |
| **1991/92** | 1309.128 | 1268.861 | 948.29 | 908.562 | 1304.1 | 1237.814 | **3561.518** | 3415.237 |
| **1992/93** | 1391.068 | 1341.818 | 787.4 | 843.761 | 1489.55 | 1260.461 | **3668.018** | 3541.463 |
| **1993/94** | 1679.12 | 1338.203 | 664.02 | 830.3576 | 1260.72 | 1265.488 | **3603.86** | 3628.038 |
| **1994/95** | 896.749 | 1260.154 | 725.63 | 837.6534 | 1068.33 | 1243.088 | **2690.709** | 3545.348 |
| **1995/96** | 1142.224 | 1185.838 | 1122.996 | 841.5675 | 1039.75 | 1225.062 | **3304.97** | 3471.087 |
| **1996/97** | 1023.767 | 1113.87 | 1424.189 | 843.3558 | 923.8777 | 1209.784 | **3371.833** | 3402.124 |
| **1997/98** | 952.5123 | 1043.427 | 1694.977 | 843.7623 | 905.9883 | 1196.294 | **3553.478** | 3336.605 |
| **1998/99** | 918.7511 | 974.0047 | 1912.885 | 843.2444 | 930.6618 | 1184 | **3762.298** | 3273.39 |
| **1999/00** | 856.8336 | 905.2831 | 2177.134 | 842.092 | 934.4613 | 1172.526 | **3968.429** | 3211.756 |
| **2000/01** | 901.968 | 837.0532 | 3079.697 | 840.4943 | 963.4717 | 1161.628 | **4945.137** | 3151.232 |
| **2001/02** | 1180.004 | 769.1752 | 3518.962 | 838.5779 | 1365.199 | 1151.142 | **6064.164** | 3091.503 |
| **2002/03** | 1438.573 | 701.5536 | 3847.941 | 836.4293 | 1461.492 | 1140.956 | **6748.006** | 3032.352 |
| **2003/04** | 1475.794 | 634.1218 | 4710.687 | 834.1088 | 1551.949 | 1130.993 | **7738.431** | 2973.629 |
| **2004/05** | 1460.971 | 566.8325 | 4007.038 | 831.6593 | 1418.441 | 1121.196 | **6886.45** | 2915.228 |
| **2005/06** | 1338.4 | 499.6516 | 3523.52 | 829.1115 | 1384.32 | 1111.527 | **6246.24** | 2857.072 |
| **2006/07** | 1252.215 | 432.5543 | 3656.226 | 826.4881 | 1273.574 | 1101.955 | **6182.015** | 2799.105 |
| **2007/08** | 1191.824 | 365.5219 | 4228.949 | 823.8058 | 1209.896 | 1092.459 | **6630.669** | 2741.284 |
| **2008/09** | 1104 | 298.5407 | 4710 | 821.0772 | 1360 | 1083.024 | **7174** | 2683.578 |

Renewals and enhancements are the main area that has seen the largest increase in costs compared to the counterfactual. A counterfactual scenario would have seen limited renewal or enhancements as the network would have continued to have been run on a stagnated basis. There may have been increases after the Labour Government implemented a sustainable transport policy but the funds to maintain this would have been from the Treasury and would have been limited. There has been a significant increase in renewals since privatisation including CrossRail and the West Coast mainline. Flybjerg found that cost over-runs for rail occur at around 42% compared with road building at 20% (Flyvbjerg, 2007a), and

Chevroulet, in a recent article on transport over-runs, found that one in four projects achieved cost over-runs of more than 20% (Chevroulet et al., 2011). It is possible that this explains some of the significant cost increases that have been seen since privatisation.

The actual maintenance costs initially fell after privatisation and then rose considerably after the Hatfield Crash. The costs have reduced since Hatfield and coupled with the efficiency gains enforced by the ORR on Network Rail have managed to fall below pre-privatisation levels in recent years. The counterfactual maintenance costs were expected to reduce after privatisation. This is in-line with the decision by the Conservative Government to run the network with increased fares and a stagnated service. Maintenance would be minimal, and only where necessary, and the efficiency gains from the OfQ initiative would have seen a continued reduction in costs. Figure 6-2 shows the reduction in maintenance since privatisation and clearly highlights the increase post-Hatfield.

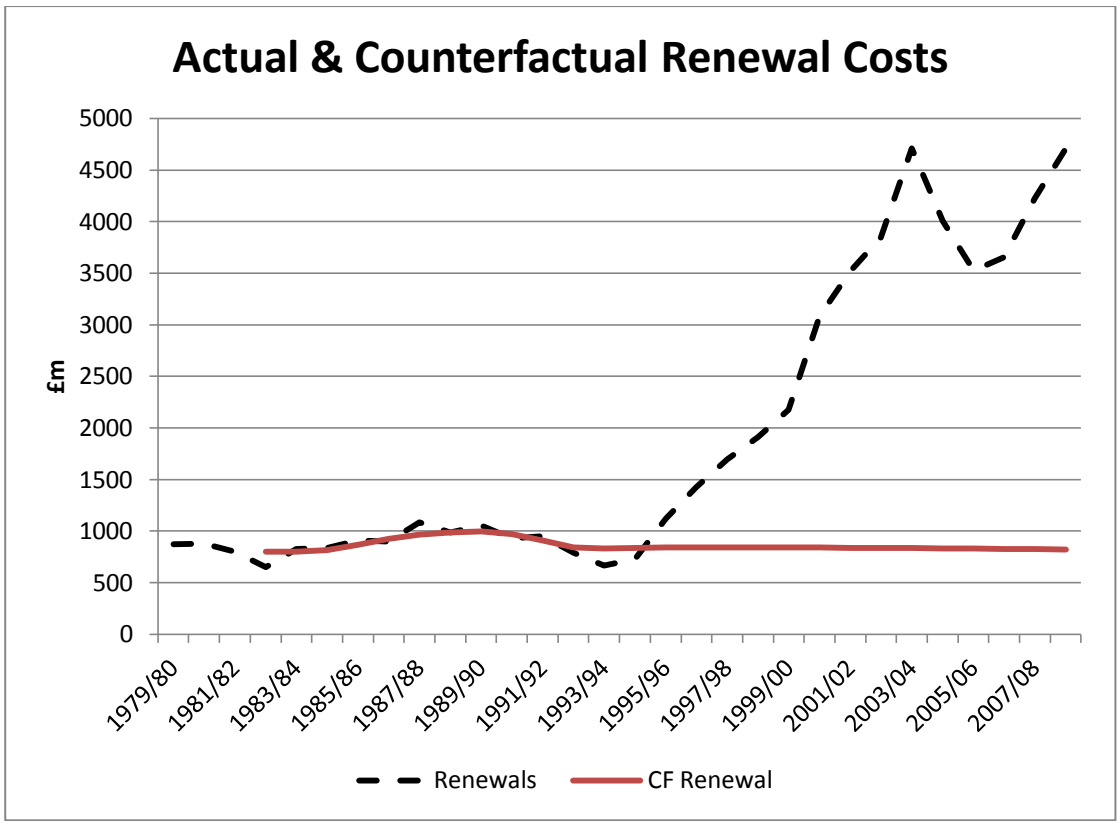
**Figure 6-2 Actual and Counterfactual Maintenance Costs**




The decrease in maintenance immediately after privatisation is evident from the graph and the increase after Hatfield is also apparent, but it is also seen that maintenance costs fell after the essential maintenance had been completed. Prior to the OfQ initiative, and changes in accounting that this entailed, there was a significant decrease in maintenance costs. The rise after the instigation of OfQ will have to take accounting changes into consideration. The final cost calculations for Total Operating and Total Industry are correct and will therefore absorb any anomalies in the accounting procedure by aggregation.

The increase in renewals and enhancements has far exceeded the counterfactual by more than five times the amount and this is clearly highlighted in the graph. Accounting changes will have impacted on the data and is something that is hard to quantify. Changes to the Rail objectives by the Labour Government can be identified through the increase in renewals that will include the Crossrail and Thameslink lines as well as the Western Mainline upgrade. Renewals and enhancements remained steady during the pre-privatisation period and were expected under a Conservative Government to decrease as cost efficiency methods took effect (Figure 6-3). The change in Government and therefore change in priority towards an integrated transport plan meant the renewals sector increased to accommodate extra lines, extra capacity and predicted growth. The anomaly that is apparent is that none of this additional infrastructure renewal was planned until the 10 Year Plan for the Transport 2000 report (DfT 2000); therefore the increase in costs for renewals prior to 2000 must be interpreted as being due to the switch to Modern Equivalent Asset Valuations (MEA) which change the rate of the historic depreciation values, or as a product of the infrastructure privatisation methodology in the form of Railtrack and the cost overruns and inefficiency that has been reported (Gourvish, 2008).

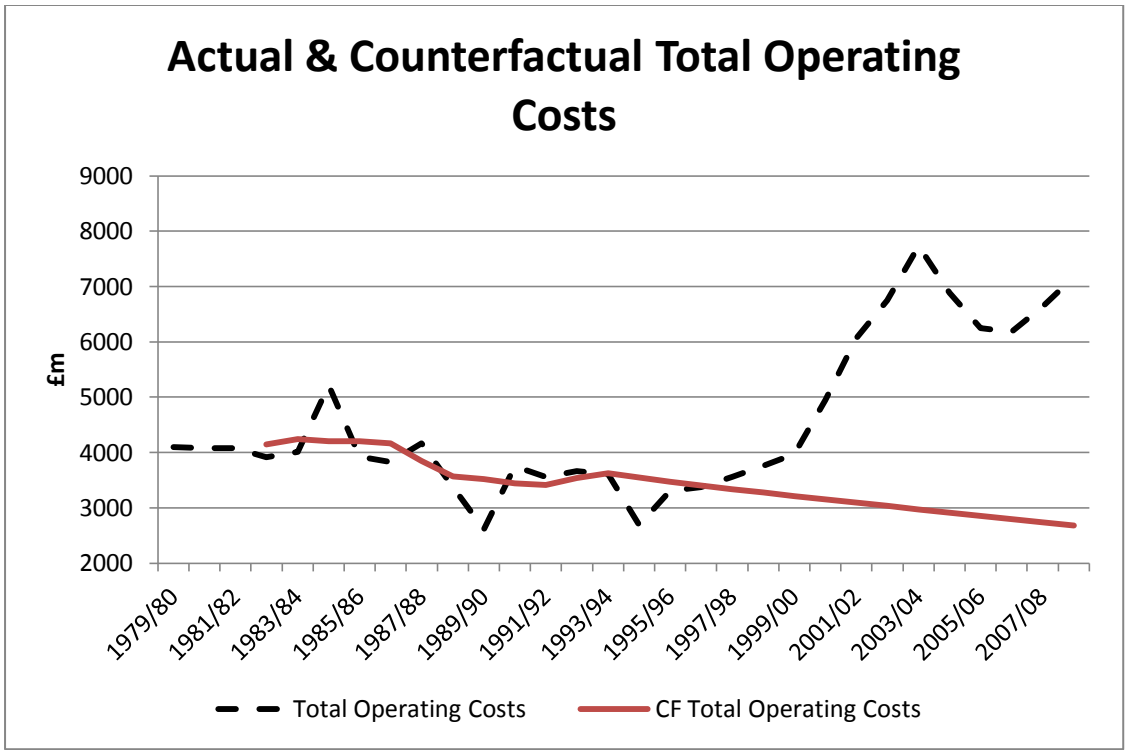
**Figure 6-3 Actual and Counterfactual Renewal Costs**



For renewal costs to have risen so sharply and consistently after privatisation demands questions about the accountability of Railtrack to be considered and also asks why this increase was not questioned before the Hatfield crash pushed Railtrack firmly into the limelight.

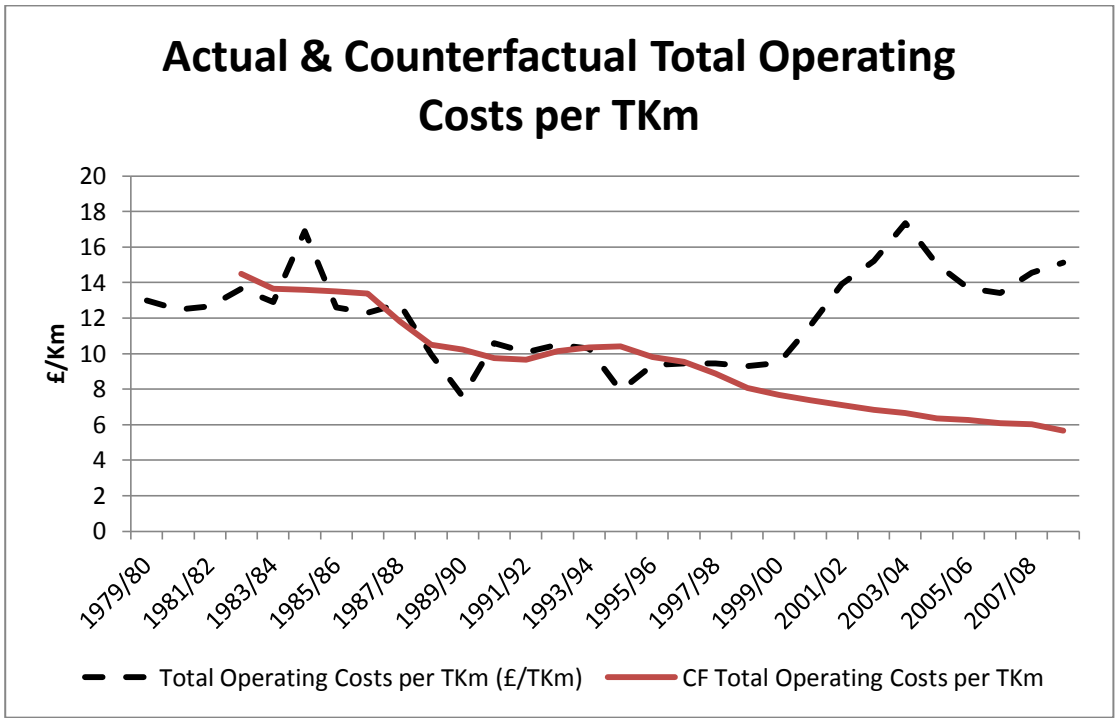
Total operating costs (Figure 6-4) for the privatisation period must therefore reflect the large increase in renewal costs and account for the increased maintenance after Hatfield. Total operating costs for the year of privatisation are considerably less than average and highlight either the inadequacies of the data provision during the transition years or the lack of comprehensive explanation on the costs during this time.

**Figure 6-4 Actual and Counterfactual Total Operating Costs**




Before concluding on the costs of operating the infrastructure, and a counterfactual scenario, it is important to compare them to the amount of train Km that were available to be travelled over the research period (Figure 6-5) as this will give an indication of whether the costs have increased or whether the increase in trains has meant that costs are averaged out and absorbed into an increased service.

**Figure 6-5 Actual and Counterfactual Total Operating Costs per Train Km**



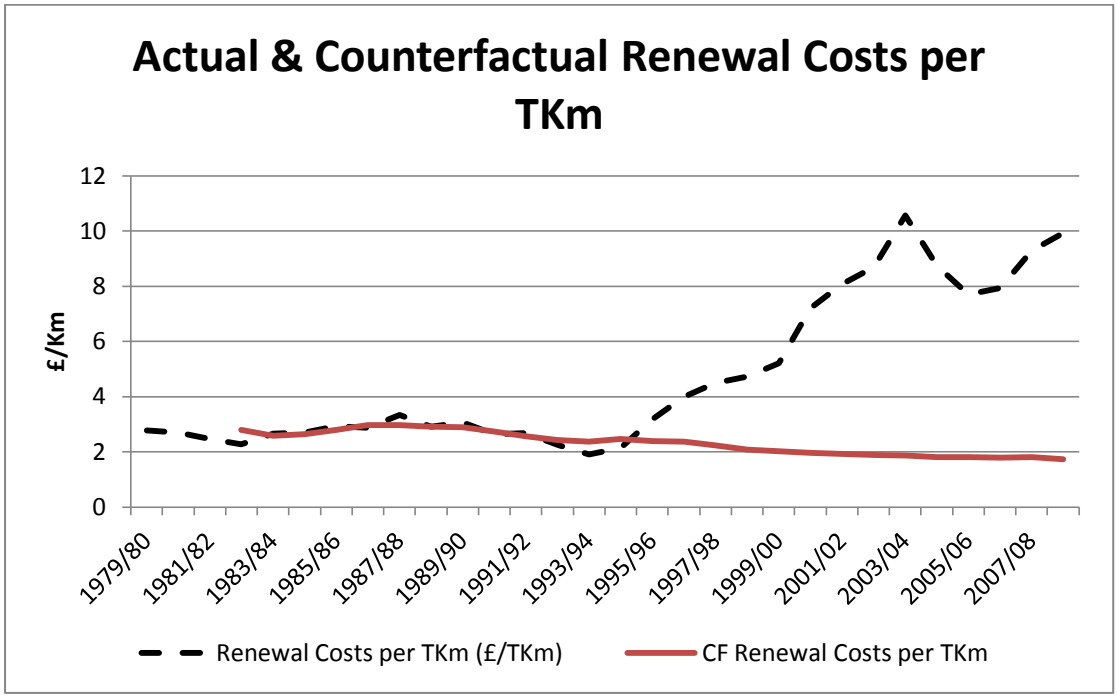

Overall costs were anticipated to decrease over time as the infrastructure was maintained at serviceable levels and renewals were kept to minimum. The counterfactual would have seen a stagnation of service, and little change to the train Km as seen in the previous chapter, so if the OfQ initiative had succeeded in commercialising the railways and increasing efficiency and transparency the costs per train Km would have seen the fall that is predicted in the counterfactual. Therefore, the costs per train Km were expected to reduce as the efficiency measures instigated as a result of competition took effect (Figure 6-5). The actual total costs per train Km have increased substantially and highlights that even though the service has increased the costs are still considerable higher than a counterfactual. This is not something that would have been predicted and, as it has been demonstrated in the literature review, the privatisation initiative was developed to increase cost efficiency through competition. The fact that the total costs have increased, and renewals in particular have increased exponentially, the impact of privatisation has not had the desired effect.

There has been a considerable amount of work that has tried to explain this increase. Some of the blame is put to Railtrack and the fact that it was accountants that managed the infrastructure rather than engineers (Gourvish, 2008, Preston, 2007) and the knowledge of actual cost of infrastructure maintenance was lost in the desire to contract out for the greatest perceived value. Wheat (2008) suggests that instead of measuring cost against train kilometres it is more effective to use tonnage (Wheat and Smith, 2008) as heavier trains cause

more damage, whereas Cowie (2010) finds that the increase in operating costs is not always as high as it is sensationally reported in the press and he questions whether the increase occurred after privatisation and did not start before (Cowie, 2010b). Cowie also suggests that rising operational costs could also be due to imperfect competition in sub contractor markets that drives up costs (Cowie, 2010) coupled with an increase in managerial costs. The OfQ initiative had tried to address this issue and had rid British Rail of the top heavy management structure therefore privatisation has gained inefficiencies in this area whilst attempting to reduce them in others.

When considering renewal costs on their own, there is an evident trend of reduction apparent prior to privatisation that is reversed at the point of privatisation (Figure 6-6).

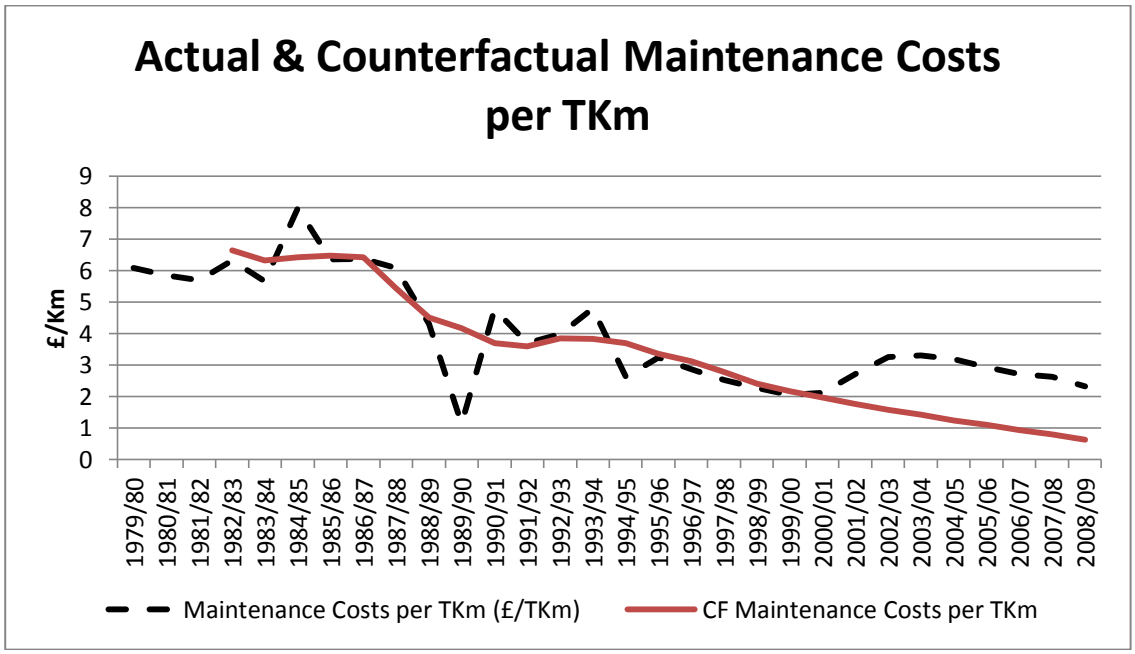
**Figure 6-6 Actual and Counterfactual Renewal Costs per Train Km**




The explanations given above to explain the increase in renewal costs per TKm should also include the fact that an element of 'privatisation effect' is deemed to have occurred.

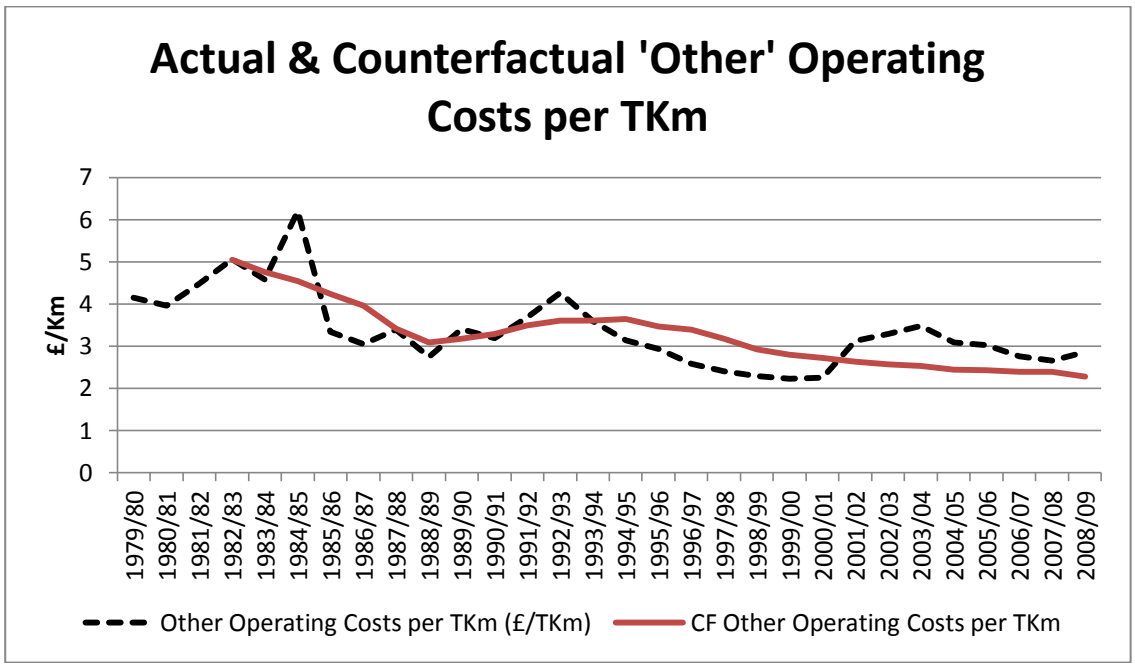
Figure 6-7 graphically highlights the actual and counterfactual maintenance costs and it is clearly apparent that had the Hatfield Crash not have occurred the actual costs were broadly in line with the counterfactual. That said, it must be remembered that the Hatfield crash was caused by defective and poor maintenance during the Railtrack ownership and it could, therefore, be a lack of maintenance that was overpriced that occurred or efficiency had been achieved in cost but not in quality.

**Figure 6-7 Actual and Counterfactual Maintenance Costs per Train Km**




The maintenance costs (Figure 6-7) per TKm post Hatfield do not highlight any reduction in trains immediately around the event – this would increase the cost per TKm – but the majority of trains were on a 'go slow' rather than cancelled although there would have been some cancellations. All 'other' costs have maintained a similar trend to the counterfactual scenario apart from the Hatfield Crash and subsequent increase in costs (Figure 6-8).

**Figure 6-8 Actual and Counterfactual 'Other' Operating Costs per Train Km**



Costs of maintaining the infrastructure and increasing the capacity after the Transport 2000 Plan have far outstripped the costs that it is believed would have occurred if the infrastructure had not been privatised. How the Labour Government would have instigated their Sustainable Transport Plan under a nationalised structure is open to suggestion – by the time this came about the OfQ would have been running for a decade. Competitive bidding for maintenance and renewals were seen as ineffective and control over costs was purely carried out through accounting procedure rather than through an understanding of the railway needs. Although this may provide an explanation for the increase in costs it does not answer the immediate question of why this occurred and why it was not confronted earlier. The costs of maintaining the railway, when compared to the counterfactual scenario, clearly show that there will need to be a significant benefit from privatisation to outweigh any of these costs that have been incurred.

The next section looks at the Operator costs – the previous chapter looked at the benefits – and explores how much of a difference the privatisation initiative has had on the costs of running the service.

## 6.3 Train Operator Costs

Train Operator costs are deemed to be those costs directly attributable to operating the trains. This will include train leasing post privatisation and the cost of purchase prior to privatisation. The responsibility for costs and proportion of total costs has changed over the research period and separating out the different parts has been fraught with difficulties due to accounting procedure changes and itemisation of the parts. Some costs have been the direct responsibility of the TOCs since privatisation but others will have a shared responsibility with NR. In some instances the cost is described within the franchise agreement and cannot be trimmed or removed by the TOC. An example of one of these costs was catering. Catering on the long distance routes was seen as a specification of the franchise. Passenger use of the catering service was declining[32] and the cost outweighed the perceived benefit. Until recently, as the catering was a requirement it had to be provided, but now the requirement has been removed from the franchise agreement the catering service has also been removed.

Accounting differences over the time period are only one reason that cost the calculation has proven difficult to obtain. Changes in franchise ownership and the franchise map, difficulty in obtaining cost data from the current franchisees, and changes in the regulatory regime and

[32] No judgement as to why this was the case is made here

grant or subsidy quotas have all played a significant role in altering the manner in which costs can be identified. Some franchises are currently at the stage of the franchise where they pay the DfT a premium for operating the service whereas other franchises are still in receipt of an operating subsidy. The original franchise map contained 25 different franchises whereas the current franchise map has only 18 franchises. In some cases franchises have been absorbed into another franchise and in other instances the franchise route has been given to more than one franchise. In some cases this will have altered the sector that the franchise was originally counted in. Some of the long distance routes will now contain routes previously counted in the regional sector or L&SE sector and conversely, routes previously regional or L & SE will have changed sector. The changes will also have affected the cost of staffing, frequency and cost of running the trains, and may have affected maintenance costs.

Pre-privatisation costs cannot be disaggregated into individual operators. Some accounting has been made in the annual reports for sector costs in some years, but not for all years, and where accounting measures have been taken they tend to be for operating costs only and do not account for capital costs. Once OfQ was instigated in 1990 the profit centres began reporting on their individual remits. This was a completely new management structure and meant the data reported differed significantly from previous years. What can be identified though is a general overview of operator costs since privatisation and a breakdown of the current individual operator costs and costs by sector. These cost calculations will enable an overview of the passenger operating sector to be analysed in greater depth and will give a fuller understanding of the total costs used in the cost benefit analysis. The next section looks at the sectors Long Distance, London & SE and Regional and helps to create an understanding of the differences in the cost of operating in each sector. The calculations are made using the data taken from the TAS Rail Monitor 2010.

### 6.3.1 Sector Analysis

There has been a marked increase in capital expenditure in the Long Distance and London & SE sectors as well as a general increase in operating costs. On their own, the figures look bleak yet these costs need to be compared to the income generated and actual costs per train Km before any assumptions are made. Capital costs also have a long run time and should therefore not be taken as a comparison to future costs. Table 6-4 shows the OPEX and CAPEX for the three sectors for the two years 2006/07 and 2007/08.

**Table 6-4 OPEX and CAPEX for the Rail Sectors**

| **Sector Costs** | Long Distance (InterCity) | | London & SE | | Regional | |
|---|---|---|---|---|---|---|
| | 2006/07 | 2007/08 | 2006/07 | 2007/08 | 2006/07 | 2007/08 |
| Operating Costs (OPEX) | 2708.39 | 2952.72 | 3400.16 | 3546.49 | 1558.22 | 1683.01 |
| Capital Expenditure (CAPEX) | 4.1 | 66.2 | 47.1 | 69.7 | 31.9 | 35.7 |
| TOTAL | 2712.49 | 3018.92 | 3447.26 | 3616.19 | 1590.12 | 1718.71 |

Source: TAS Rail Monitor 2010

There has been a significant increase in capital costs in the Long distance sector although this is only accounting for a one year increase and may not be representative of the entire timeline. Once the operating costs are broken down and compared to costs per train Km (Table 6-5), it can be seen that there has been a general fall in costs of 14% on the passenger railway since privatisation.

**Table 6-5 Operating Costs per Train Km by Sector**

| **Real Operating Costs per Train Km by Sector £km (2008 prices)** | | | | |
|---|---|---|---|---|
| | Long Distance (InterCity) | London & SE | Regional | National |
| **1996/97** | 27.97 | 16.25 | 13.28 | 17.26 |
| **1997/98** | 26.72 | 15.6 | 12.55 | 16.45 |
| **1998/99** | 25.29 | 14.81 | 11.83 | 15.61 |
| **1999/00** | 24.8 | 14.73 | 11.54 | 15.36 |
| **2000/01** | 21.68 | 13.7 | 10.86 | 14.22 |
| **2001/02** | 23.49 | 13.27 | 10.39 | 14.62 |
| **2002/03** | 24.9 | 13.95 | 10.77 | 15.02 |
| **2003/04** | 24.01 | 15.18 | 11.51 | 15.83 |
| **2004/05** | 22.23 | 14.97 | 11.59 | 15.39 |
| **2005/06** | 21.29 | 15.65 | 10.61 | 15.02 |
| **2006/07** | 20.48 | 15.49 | 12.66 | 14.85 |
| **2007/08** | 22.08 | 17.26 | 12.62 | 17.12 |
| **2008/09** | 20.69 | 17.38 | 13.18 | 17.25 |

Source: TAS Rail Monitor 2010

This is a significant drop in operating costs and this could be seen as a direct response to privatisation: streamlining of operations was considered to be an essential requirement that privatisation of the industry would produce through competition. Staff costs have been seen to have risen above the level of inflation and TOCs have tackled this by reducing staffing in many areas from 135,000 jobs in 1993 to 43,000 in 1998: a considerable reduction in light of

the increase in patronage. There is evidence that this has been an outcome of the privatisation initiative as it will have impacted on the reduction of train operating costs per Train Km. There is also evidence, as seen in previous chapters, that the reduction in staffing became a factor in the subsequent failure of some of the TOCs as they quickly came to realise that it was not possible to run the railways with the staffing numbers budgeted for in the franchise bidding process. All sectors show a reduction in costs per Km up until the Hatfield Crash although the steady rise in costs since this event has not reached the initial costs in any sector bar London and SE (Table 6-5).

It is important to remember that there have been changes in the accounting procedures and a general reduction in access charges paid by the operators to NR due to the shift in Government funding to grants paid directly to NR. Compensation payments to the operators from NR have also impacted on the operating costs. The Hatfield incident in 2000 and the recent West Coast mainline delays will have had the most profound effect. As previously mentioned, there have been changes to the franchise map and this will have an impact on the final costs comparisons for each sector. In recent years the inclusion of 'Open Access' Operators on certain routes will have had an impact on the costs of operating the railways. Open Access Operators are not included in the cost structure and they do not pay access charges the same way that the franchised operators do. At present, their impact is minimal but the burden of choice on some routes and the differing cost structures for maintenance will impact on the costs and revenue of those routes affected. Preston (2010) suggests that the 'niche' open access operators currently running services are providing a 'socially desirable' service (Preston, 2010), but due to the limited amount of open access competition on the passenger sector the majority of the research concerns itself with freight (Drew, 2009, Cowie, 2010a).

### 6.3.2 Individual Franchise Costs

In general terms the profit margins for the train operators has grown since privatisation quite considerably. Apart from the reduction in patronage during and immediately after the Hatfield incident in 2000 and the impact on the revenue this will have entailed, the operators have seen an increase in their profit margins year on year (Table 6-6). Even accounting for the Hatfield incident – which has been shown to have had a profound effect on the costs and benefits to all stakeholders so far – the drop in profit was marginal and a profit was still returned. There is an argument here that increased subsidies and compensation payments for

the Hatfield crash will have increased the overall profit made by the operators as the national 'go slow' on all lines took its toll on passenger revenues.

**Table 6-6 Average Profit Margins for Operators since Privatisation**

| **TOC Profit margins** | Operating margin % |
|---|---|
| **1995/96** | |
| **1996/97** | 1.2 |
| **1997/98** | 3.6 |
| **1998/99** | 3.5 |
| **1999/00** | 3.2 |
| **2000/01** | 2.2 |
| **2001/02** | 3.5 |
| **2002/03** | 4.3 |
| **2003/04** | 4.8 |
| **2004/05** | 4.3 |
| **2005/06** | 3.5 |
| **2006/07** | 3.7 |
| **2007/08** | 4 |
| **2008/09** | 3.9 |

Source: TAS Rail Monitor 2010

The average profit margins are impressive in the respect that they are sustained and generally increasing. This is also surprising when you consider that almost half of the original franchises awarded failed within the first few years and instances of Operators returning their franchises, although significantly reduced, is still an occurrence from time to time[33]. Sustained profit is not necessarily true for all operators though; some have seen larger profits than others with a minority returning losses. Table 6-7 shows the different profit margins for each operator in 2007/08, the revenue received and the actual costs and profits that were made for that year.

[33] East Coast Mainline an example of two failed franchise awards in 5 yrs.

**Table 6-7 Operating margins for 2007/08 for each Franchise Operator**

| **Individual Train Operators - Operating Margins 2007/08 %** | | | | |
|---|---|---|---|---|
| | Operating margin | Pass Rev £m 2007/08 | Operator Profit £m | Operator Cost £m |
| First Transpennine | 14.5 | 106.8 | 15.486 | 91.314 |
| West Coast | 12.7 | 581.66 | 73.87082 | 507.78918 |
| Gatwick Express | 9.1 | 68.99 | 6.27809 | 62.71191 |
| Merseyrail Electrics | 6.7 | 30.05 | 2.01335 | 28.03665 |
| Southern | 5.7 | 371.39 | 21.16923 | 350.22077 |
| Arriva Trains Wales | 4.5 | 75.95 | 3.41775 | 72.53225 |
| First ScotRail | 4.4 | 215.46 | 9.48024 | 205.97976 |
| Northern Rail | 4.2 | 147.76 | 6.20592 | 141.55408 |
| NX East Coast | 4.2 | 566.31 | 23.78502 | 542.52498 |
| London Overground | 4.2 | 1.33 | 0.05586 | 1.27414 |
| Southeastern | 3.1 | 431.98 | 13.39138 | 418.58862 |
| NEX East Anglia | 2.3 | 476.95 | 10.96985 | 465.98015 |
| c2c Rail | 2.2 | 98.3 | 2.1626 | 96.1374 |
| East Midlands Trains | 2.1 | 280.23 | 5.88483 | 274.34517 |
| South Western | 2.1 | 536.88 | 11.27448 | 525.60552 |
| First Capital Connect | 1.5 | 404.4 | 6.066 | 398.334 |
| New Cross Country | 1.1 | 120.87 | 1.32957 | 119.54043 |
| London Midland | 0.7 | 56.54 | 0.39578 | 56.14422 |
| First Great Western | -1.1 | 613.73 | -6.75103 | 620.48103 |
| Chiltern | -3.3 | 92.5 | -3.0525 | 95.5525 |
| **TOTAL** | | **5278.08** | **203.43324** | **5074.64676** |

Source: TAS Rail Monitor 2010

There may well be an element of compensation in the total profit margin for the West Coast franchise, run by a joint Virgin/Stagecoach venture, due to the severe delays by NR in completing the improvement works. The Gatwick Express was a premium service running half hourly services to London Victoria from Gatwick Airport but this has now been absorbed into the Southern franchise. The ticket price is considerably more than the local services and is favoured by commuters and visitors to Gatwick due to its non-stop journey into London. That said, the staffing levels are higher, and the train specification is also higher than the average traction, which will increase the operators costs of this service.

Chiltern Railways are the only franchise showing a significant loss for the year 2007/08. This is one example of a 'design, build, finance, transfer' (DBFT) scheme in the rail sector and Chiltern Railways' Project, Evergreen 2, was committed infrastructure expenditure as part of its franchise agreement. However, this franchise is unusual in that it is the only one to date where the franchisee has responsibility for infrastructure works. Network Rail may be moving towards a situation where train operating companies are allowed to take on small

infrastructure projects, of up to £25 million in value and this could have substantial implications for how projects are tendered in the future.

In the majority of cases it is clear that income exceeded costs but there are a few TOCs that have experienced large cost increases compared to income and others that have seen large rises in income compared to costs. Subsidies paid by the Government to the TOCs have now started to fall as many of the main operators have started to pay premiums for their franchises. The average profit margin for 2007/08 stands at 4.05% which is more than the averaged aggregated profit margin of all the operators over the 15 years since privatisation which stands at 3.5%. In the present economic climate the profits received by the operators seem to be faring better than many of the other travel industries such as airlines.

An area of contention has been, as it has been seen, that of the rolling stock leasing. A lack of available rolling stock pushed up prices and reduced choice resulting in overcharging estimates of around £177 million a year (CC 2008). Differences in the rail infrastructure with regard to electrification method meant that choice of traction was limited and there were no guarantees of available stock at the beginning of a franchise period. Due to the varying lengths of the franchises investment into rolling stock became one of the largest costs to the TOCs (Preston, 1999a) and rolling stock replacement has not been undertaken at the level anticipated by the previous Government[34]. This is borne out by the investment levels and age of rolling stock reported in the Railway Statistics yearly figures.

When account for the profit made on average by the TOCs is taken, and compared to the costs incurred, it becomes apparent that there have been significant changes in the allocation of benefit. If costs have doubled and profits increased then it would be fair to say that revenue must also have increased substantially either through more ticket sales, higher ticket prices, or a combination of both. Therefore, although the increase in costs incurred by the train operators is considered a dis-benefit, the increase in patronage, and therefore increases in revenue, has meant that the train operators have seen increased profits since the beginning of privatisation. The problem seems to be that some of the benefits to the train operators have come at a cost to both the users – through increases in fares and reduction in service quality, and the government/tax payer through higher subsidies and increased investment and capacity measures, although it is primarily the latter.

[34] See 2007 White Paper PICARD, N., ANTONIOU, C. & DE PALMA, A. 2010. Working paper 2.4: Econometric Models. *Sustain City.* EU.

Track access charges, those payments made by train operators for using the track provided by the infrastructure owner NR, have seen significant changes over the privatised period that will have impacted on the profits shown by the operators. Originally, the charging regime was set by the Rail Regulator and much of the cost was borne by the Government in the respect of subsidies to the operators for running the service. The revised access charging regime came into force in 2001 at the start of the second control period (CP2). The subsequent changes after the Hatfield crash and acquisition of Railtrack by Network Rail in 2002 meant the charging regime was adjusted in 2004 – nearly 2 years earlier than planned. One of the main changes made during CP2 was the allocation of funds direct from the SRA rather than the TOCs. Increases in access charges were also postponed in 2004 and the money that should have been paid by the TOCs was now received by NR in the form of additional borrowing. The amounts were eventually claimed back from the TOCs in CP3 and would therefore have an impact on the amount of access charges paid over the period and meant significant changes in the reported operating costs of the operators over this time period. Investment is still emphasised through direct funding rather than access charges and the TOCs have therefore enjoyed reduced access charges in recent years.

Recent work has looked at the impact of access charges on covering actual costs (Calvo and De Oña, 2012). Calvo found that the cost recovery was higher on regional railways and those countries that operated a full-cost recovery system achieved a higher ratio of maintenance and renewal costs than those who employed a marginal cost system – of which the UK is one. This does not have implications for this research but does underpin the difference between operator and government costs and would be a recommendation for policy to consider.

Now a greater understanding of how operator costs have evolved of the time period has been achieved, and the changes in accounting procedures and regulation have impacted on these costs, a counterfactual argument can be developed to look at what would have occurred if the industry had not had a privatisation policy implemented. This is the topic of the next section.

## 6.4 Operator Costs and the Counterfactual

Developing a counterfactual that takes into account all the stakeholders and the changing cost regime was necessary in order to understand how the privatisation initiative had impacted on costs. Regarding total operating costs applicable to the operator, for the purpose of the cost benefit analysis, the costs have been disaggregated into TOC operating costs – those costs specific to running the trains and including access charges – and the actual cost of the trains

themselves. In the original cost methodology, by Smith (2006), the freight costs were included as part of the overall cost structure. For the purposes of this research they have been removed as the focus is on passenger rail and not total rail. Accounting for regulatory costs has proven difficult for the period prior to privatisation as this was not necessarily applicable and any comparable costs were not included in any of the final accounts.

For the years prior to privatisation some assumptions have been made when calculating the total operating costs for the TOCs due to the lack of disaggregation in the annual accounts. In many instances costs have been disaggregated into specific services such as catering and station maintenance and where this has occurred they have been assigned to the appropriate cost column. Where costs have not been able to be assigned the total costs for the specific service have been split in proportion to where the responsibility for the cost lies (as highlighted in the original cost breakdown at the beginning of the chapter). The following tables (Table 6-8 and Table 6-9) show the total costs and counterfactual costs for the train operating (passenger service) costs.

**Table 6-8 Actual and Counterfactual Train Operating Costs (2008 Prices)**

| | TOC-own operating costs | CF TOC-own Operating Costs | Rolling stock capital expenditure | CF Rolling Stock Capital Expenditure |
|---|---|---|---|---|
| **1979/80** | 2706.818 | | 352.47 | |
| **1980/81** | 2739.735 | | 401.25 | |
| **1981/82** | 2717.029 | | 312.83 | |
| **1982/83** | 2502.13 | 2708.73 | 270.3 | 279.232 |
| **1983/84** | 2669.909 | 2719.253 | 164.45 | 236.239 |
| **1984/85** | 3122.878 | 2644.76 | 142.19 | 200.811 |
| **1985/86** | 2428.9 | 2623.558 | 181.6 | 182.051 |
| **1986/87** | 2282.94 | 2657.446 | 178.2 | 202.117 |
| **1987/88** | 2724.198 | 2709.959 | 217.33 | 256.785 |
| **1988/89** | 2786.714 | 2748.131 | 418.08 | 323.86 |
| **1989/90** | 3531.21 | 2798.989 | 435.24 | 416.743 |
| **1990/91** | 2402.286 | 2870.987 | 559.3 | 533.358 |
| **1991/92** | 2818.133 | 2834.051 | 729.33 | 617.618 |
| **1992/93** | 2908.99 | 2684.564 | 832.35 | 650.492 |
| **1993/94** | 2232.561 | 2621.86 | 645.66 | 633.478 |
| **1994/95** | 3231.2 | 2628.005 | 536.4 | 678.9679 |
| **1995/96** | 3122.741 | 2629.848 | 288 | 724.6409 |
| **1996/97** | 4009.256 | 2628.988 | 70.31106 | 770.4289 |
| **1997/98** | 3856.389 | 2626.371 | 155.0577 | 816.2916 |
| **1998/99** | 3798.116 | 2622.578 | 231.9187 | 862.2044 |
| **1999/00** | 3799.118 | 2617.978 | 307.1094 | 908.1515 |
| **2000/01** | 4243.469 | 2612.812 | 698.2857 | 954.1227 |
| **2001/02** | 4467.092 | 2607.241 | 1143.528 | 1000.111 |
| **2002/03** | 4851.89 | 2601.374 | 691.0885 | 1046.112 |
| **2003/04** | 5047.138 | 2595.289 | 913.0746 | 1092.123 |
| **2004/05** | 5217.937 | 2589.04 | 1031.277 | 1138.14 |
| **2005/06** | 5434.768 | 2582.665 | 624.2342 | 1184.163 |
| **2006/07** | 4994.736 | 2576.195 | 351.9612 | 1230.189 |
| **2007/08** | 5012.455 | 2569.65 | 416.755 | 1276.219 |
| **2008/09** | 6379.42 | 2563.045 | 345.627 | 1322.252 |

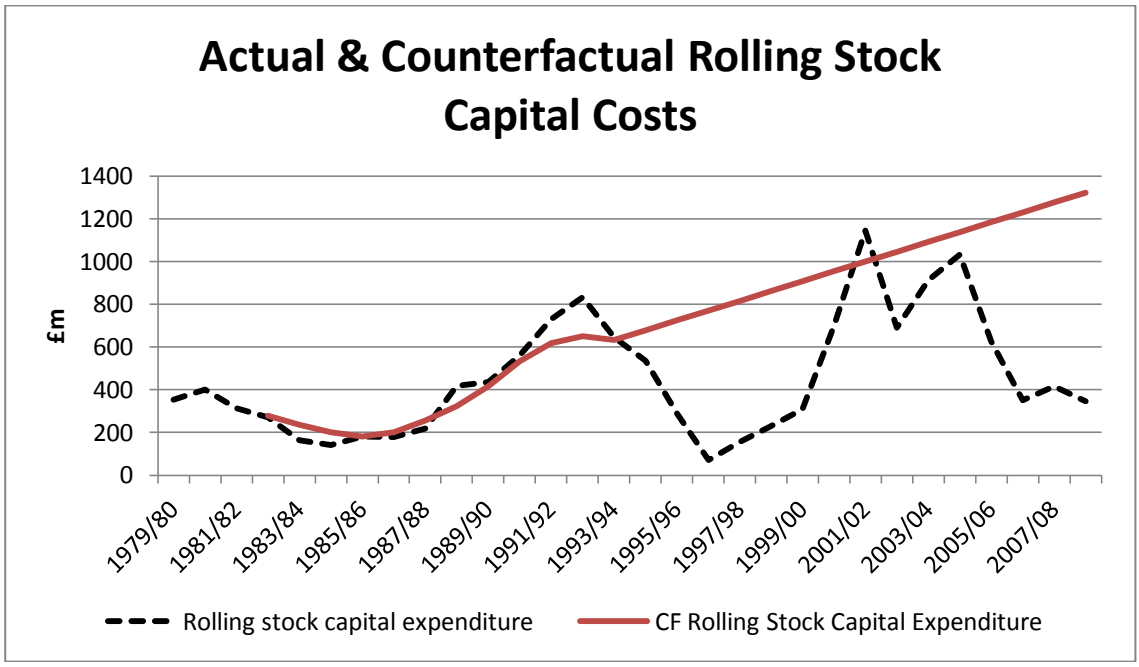
It is clear that operator costs have increased under a privatisation policy. The counterfactual would have seen a stagnated service and a streamlining of operations under the OfQ initiative. The fact that costs have risen so dramatically yet Operators have continued to see a profit suggests the cost is being covered elsewhere – namely the Government through subsidy. Rolling stock increases have not risen above that of the counterfactual scenario. Much of this is accounted for by the problems encountered with the leasing structure and the difficulty of obtaining new trains.

**Table 6-9 Total Passenger Service Actual and Counterfactual Costs and Total Industry Costs (2008 prices)**

| | Total Passenger Service Costs | CF Total Passenger Service Costs | TOTAL INDUSTRY COSTS | CF Total Industry Costs |
|---|---|---|---|---|
| **1979/80** | **3059.288** | | **7158.931** | |
| **1980/81** | **3140.985** | | **7222.821** | |
| **1981/82** | **3029.859** | | **7108.99** | |
| **1982/83** | **2772.43** | 2987.962 | **6686.48** | 7137.098 |
| **1983/84** | **2834.359** | 2955.492 | **6845.168** | 7201.286 |
| **1984/85** | **3265.068** | 2845.571 | **8485.128** | 7051.266 |
| **1985/86** | **2610.5** | 2805.609 | **6538.508** | 7011.506 |
| **1986/87** | **2461.14** | 2877.351 | **6293.1** | 7044.726 |
| **1987/88** | **2941.528** | 3014.877 | **7104.77** | 6857.818 |
| **1988/89** | **3382.683** | 3132.679 | **6759.081** | 6696.465 |
| **1989/90** | **4092.001** | 3276.42 | **6702.139** | 6794.999 |
| **1990/91** | **2961.586** | 3465.033 | **6707.966** | 6907.046 |
| **1991/92** | **3547.463** | 3494.568 | **7108.981** | 6909.805 |
| **1992/93** | **3741.34** | 3363.137 | **7409.358** | 6857.722 |
| **1993/94** | **2878.221** | 3335.58 | **6482.081** | 6834.114 |
| **1994/95** | **3767.6** | 3393.789 | **6458.309** | 6803.177 |
| **1995/96** | **3410.741** | 3448.237 | **6715.711** | 6774.293 |
| **1996/97** | **4079.567** | 3500.32 | **7451.4** | 6746.7 |
| **1997/98** | **4011.447** | 3550.867 | **7564.924** | 6719.945 |
| **1998/99** | **4030.035** | 3600.385 | **7792.333** | 6693.752 |
| **1999/00** | **4106.228** | 3649.198 | **8074.657** | 6667.944 |
| **2000/01** | **4941.755** | 3697.515 | **9886.891** | 6642.407 |
| **2001/02** | **5610.62** | 3745.478 | **11674.78** | 6617.063 |
| **2002/03** | **5542.979** | 3793.183 | **12290.98** | 6591.86 |
| **2003/04** | **5960.213** | 3840.696 | **13698.64** | 6566.761 |
| **2004/05** | **6249.215** | 3888.066 | **13135.66** | 6541.741 |
| **2005/06** | **6059.002** | 3935.327 | **12305.24** | 6516.78 |
| **2006/07** | **5346.697** | 3982.504 | **11528.71** | 6491.865 |
| **2007/08** | **5429.21** | 4029.615 | **12059.88** | 6466.986 |
| **2008/09** | **6725.047** | 4076.675 | **13899.05** | 6438.139 |

Operating the railways has also seen sustained increases in costs. Rolling stock capital costs are capital outlay and not operating costs such as leasing and fuel which are accounted for in the TOC operating costs and this is why, although important to the cost benefit analysis, the capital costs are not necessarily a good guide to the overall changes in rolling stock costs (Figure 6-9).

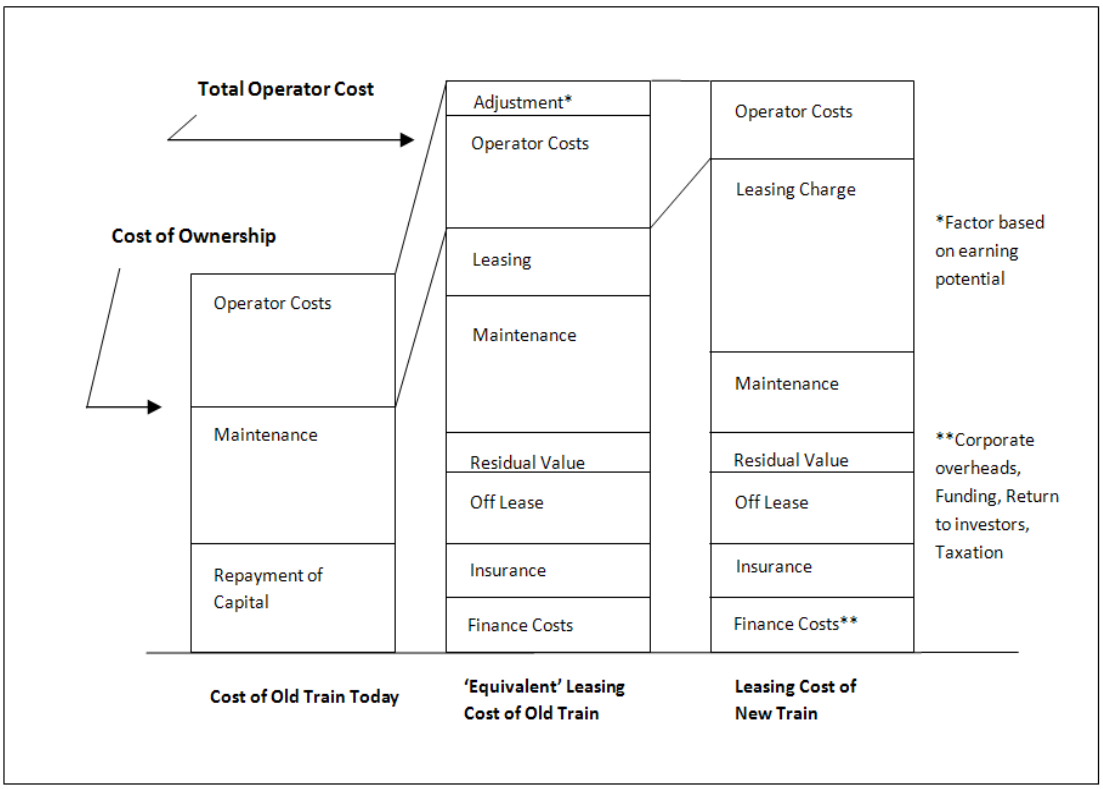
**Figure 6-9 Actual and Counterfactual Rolling Stock Capital Expenditure**




Rolling stock capital expenditure has a cyclical nature in the sense that rolling stock has an approximate lifetime of 30 years. It therefore stands to reason that if a high percentage of stock is replaced on a given year it will be a considerable time before such outlay is seen again. It may be that the leasing of the trains makes up a large portion of the train operators expenditure – an expense that cannot be escaped from.

According to Harris and Godward (1997) the leasing regime was based on an 'indifference pricing' principle where costs were distributed depending on the type and age of the train with the end result being that the total cost to the TOC was the same regardless of the traction used. Although this standardised the cost and attempted to stop Operators from choosing cheaper but possibly unsuitable rolling stock it did not give the incentive to renew stock at the speed the industry needed. It also had the negative effect of taking yet another controllable cost away from the Operators giving them little opportunity to make efficiency choices and reducing the rolling stock market to a virtual monopoly. Figure 6-10 highlights the significant overall cost increases experienced after privatisation which Harris and Godward estimate to be doubled from £400,000 in 1990 to approximately £800,000 per vehicle in 1995 (Harris and Godward, 1997). It also takes into account the change from historic cost accounting to Modern Equivalent Asset Valuation (MEA)

**Figure 6-10 Diagrammatic Comparisons of Train Ownership Costs before and after Privatisation**

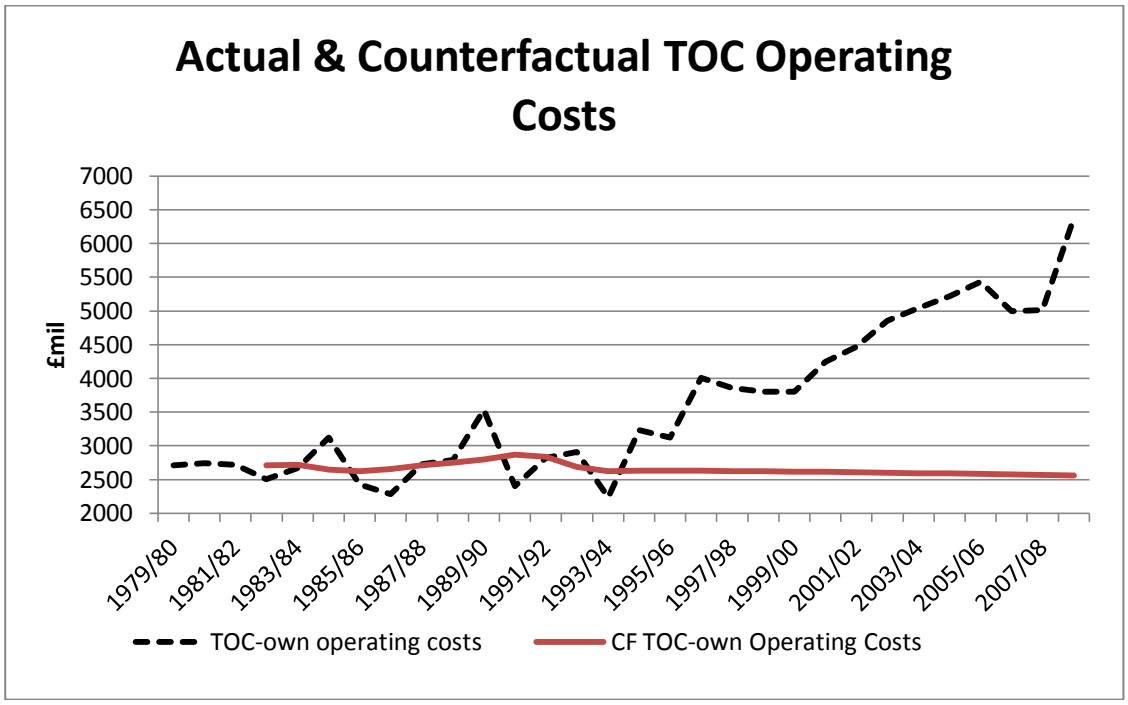



Source: Modern Railways Dec 1993 cited in Harris & Godward 1997 p72

This increase in cost will have impacted considerably on the Operators and highlights the lack of incentive to replace trains when there is limited cost reduction through increased leasing costs being outweighed by the reduction in maintenance.

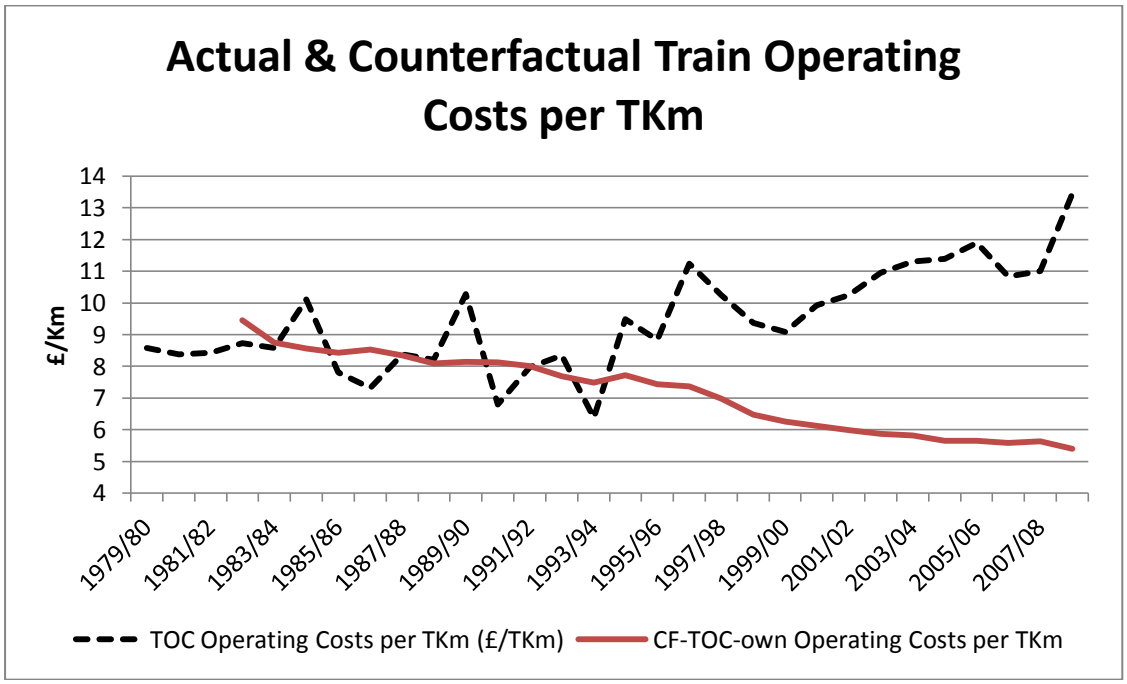
TOC operating costs have also seen large increases considering the stability that was seen prior to privatisation (Figure 6-11) over and above the increase in rolling stock. The coal strike and fuel increases are clearly apparent prior to privatisation and there is evidence of cost reduction for the three years before the Hatfield Crash – yet it was during this time of cost reduction that many of the franchisees failed (Gourvish, 2008). The costs of operating the railways for the TOCs is now twice that which is calculated as the counterfactual, but it must also be remembered that there has been a substantial rise in PKm that may offset some of the increases. The increase in costs cannot be absorbed by the TOCs who have budgeted for specific cost margins in the original franchise bids and due to the lack of manoeuvrability within the specification are limited in their ability to adapt to cost increases.

**Figure 6-11 Actual and Counterfactual Train Operating Costs**




The increase in costs apparent during the last few years forced many TOCs to look for cost efficiency and increased revenue in the most inventive and apparently news worthy ways - charging for seat reservations and adding large premiums to the first class upgrade at weekends are just two of the minor, but publicly unacceptable revenue streams that have been utilised by TOCs (TSC, 2009b). Any increases to the degree seen recently would need either subsidy cover or extra revenue streams else the franchise could fail; therefore, many of the costs must be absorbed by the rise in subsidy that has also been apparent since privatisation. In order to ascertain how much of an increase the costs have been in real terms the total costs must be compared to the amount of TKm over the period in just the same way that has been done for the other costs and benefits (Figure 6-12).

**Figure 6-12 Actual and Counterfactual Train Operating Costs per TKm**




An expected reduction in subsidy and increases in efficiency mean the actual costs would be expected to decline rather than increase so the increases that have been seen are a clear dis-benefit to the train operators and the government and therefore the tax payer and non-users. It would be expected that the actual costs would plateau for the period immediately after privatisation to enable TOCs to adjust to the change in regime and differences in allocating costs on a balance sheet compared to reality, but after a few years of adjustment, the costs should have started to decrease as the expenditure settled into a pattern and efficiency gains were targeted and achieved. That this has not been the case is argument towards the initial bidding structure being flawed and subsequent outside influences, such as the Hatfield crash, ultimately having a larger impact. It has also been seen that there is new evidence to suggest that the operator access charges are not covering the actual cost of the maintenance (Calvo and De Oña, 2012) therefore if the access charges were increased to cover maintenance there would be little profit for the Operators and a less attractive franchise proposition.

Using the costs to complete the cost benefit analysis is the remit of the next section. The process is similar to that carried out in the previous chapter on the benefits: consumer surplus.

## 6.5 Calculating the Welfare Benefit

Now all the costs have been collected, manipulated and justified, the final stages of the cost benefit analysis can be completed. The aim of this section is to find out the welfare benefit. The welfare benefit is the total cost (or benefit) to all stakeholders and represents the total cost of the policy initiative. It has already been shown that the Users and Operators have seen a benefit from the policy change therefore the final total will indicate whether the Government – and therefore non-users – will also have benefited.

The welfare benefit can be calculated using the formula:

***Change in welfare = change in revenue – change in total costs + consumer surplus***

We already know the change in consumer surplus from the previous chapter:

***Consumer Surplus* = £12.3422 (bn) *(at 3.5% NPV)***

And the change in revenue has already been calculated:

***Change in Revenue* = £2.84 (bn) *(at 3.5% NPV)***

For the calculation of change in costs there is no forecast model to use. The calculation is broadly the same as it was in the previous chapter for benefits but the forecast is replaced with the actual therefore the change in total costs will be the Actual Costs minus the Counterfactual Costs. Although the formula only takes into account the total passenger industry operating costs it is possible to see where the costs and benefits occur in the breakdown of the individual cost sections and where there are changes during the 30 year period of the research.

The counterfactual is calculated in exactly the same way as before, using 5 year moving averages, and will therefore not reflect the first two years of the research. The counterfactual data is also only included prior to privatisation as a guide to what the rolling averages were compared to the actual data. The forecasts for the counterfactual are only calculated from 1995 as this is the year privatisation occurred. The total change in costs for each data set is also only calculated from 1995 as this is the first year that all costs can be attributed to the privatisation initiative. There have been arguments put forward both in this research and other research (Smith, 2006) that argues the date to be 1992 – the year the decision to privatise was published – should be seen as transitional and dealt with separately. The

following tables (Table 6-10 and Table 6-11) show the Actual and Counterfactual costs and the change in costs over the period. The data prior to privatisation that gives the moving averages only is highlighted in italics and not used in the final totals.

**Table 6-10 Change in the Costs for the Operating of the Rail Industry (£mil 2008 prices)**

| | Maintenance | CF Maintenance | AC-CF Maintenance | Renewals | CF Renewal | AC-CF Renewal |
|---|---|---|---|---|---|---|
| **1979/80** | 1918.877 | | | 871.7 | | |
| **1980/81** | 1909.308 | | | 879.54 | | |
| **1981/82** | 1834.217 | | | 797.86 | | |
| **1982/83** | 1812.07 | *1901.76* | -89.6895 | 651.9 | *802.119* | -150.219 |
| **1983/84** | 1759.362 | *1963.629* | -204.267 | 827.31 | *801.649* | 25.661 |
| **1984/85** | 2468.804 | *1985.481* | 483.3235 | 836.27 | *814.696* | 21.574 |
| **1985/86** | 1978.078 | *2016.976* | -38.898 | 910.27 | *867.934* | 42.336 |
| **1986/87** | 1983.96 | *2003.447* | -19.4867 | 897.6 | *926.957* | -29.357 |
| **1987/88** | 1977.282 | *1765.26* | 212.022 | 1084.54 | *964.365* | 120.175 |
| **1988/89** | 1458.858 | *1528.083* | -69.2253 | 984.9 | *987.977* | -3.077 |
| **1989/90** | 387.438 | *1431.56* | -1044.12 | 1052.76 | *995.009* | 57.751 |
| **1990/91** | 1687.68 | *1305.456* | 382.2242 | 929.9 | *970.364* | -40.464 |
| **1991/92** | 1309.128 | *1268.861* | 40.2674 | 948.29 | *908.562* | 39.728 |
| **1992/93** | 1391.068 | *1341.818* | 49.2501 | 787.4 | *843.761* | -56.361 |
| **1993/94** | 1679.12 | *1338.203* | 340.9166 | 664.02 | *830.3576* | -166.338 |
| **1994/95** | 896.749 | *1260.154* | -363.405 | 725.63 | *837.6534* | -112.023 |
| **1995/96** | 1142.224 | 1185.838 | -43.6142 | 1122.996 | 841.5675 | 281.4285 |
| **1996/97** | 1023.767 | 1113.87 | -90.1031 | 1424.189 | 843.3558 | 580.8327 |
| **1997/98** | 952.5123 | 1043.427 | -90.9145 | 1694.977 | 843.7623 | 851.2148 |
| **1998/99** | 918.7511 | 974.0047 | -55.2536 | 1912.885 | 843.2444 | 1069.641 |
| **1999/00** | 856.8336 | 905.2831 | -48.4495 | 2177.134 | 842.092 | 1335.042 |
| **2000/01** | 901.968 | 837.0532 | 64.91477 | 3079.697 | 840.4943 | 2239.203 |
| **2001/02** | 1180.004 | 769.1752 | 410.8285 | 3518.962 | 838.5779 | 2680.384 |
| **2002/03** | 1438.573 | 701.5536 | 737.0197 | 3847.941 | 836.4293 | 3011.511 |
| **2003/04** | 1475.794 | 634.1218 | 841.6724 | 4710.687 | 834.1088 | 3876.579 |
| **2004/05** | 1460.971 | 566.8325 | 894.1386 | 4007.038 | 831.6593 | 3175.379 |
| **2005/06** | 1338.4 | 499.6516 | 838.7484 | 3523.52 | 829.1115 | 2694.409 |
| **2006/07** | 1252.215 | 432.5543 | 819.6604 | 3656.226 | 826.4881 | 2829.738 |
| **2007/08** | 1191.824 | 365.5219 | 826.302 | 4228.949 | 823.8058 | 3405.144 |
| **2008/09** | 1104 | 298.5407 | 805.4593 | 4710 | 821.0772 | 3888.923 |
| **Totals** | | | £5589.319 | | | £31668.81 |

**Table 6-11 Change in Other Operating Costs**

| | Other Operating | CF Other Operating Costs | AC-CF Other Operating Costs |
|---|---|---|---|
| **1979/80** | 1309.066 | | |
| **1980/81** | 1292.988 | | |
| **1981/82** | 1447.054 | | |
| **1982/83** | 1450.08 | *1445.257* | 4.823 |
| **1983/84** | 1424.137 | *1480.516* | -56.3792 |
| **1984/85** | 1914.986 | *1405.518* | 509.468 |
| **1985/86** | 1039.66 | *1320.987* | -281.327 |
| **1986/87** | 950.4 | *1236.971* | -286.571 |
| **1987/88** | 1101.42 | *1113.317* | -11.8966 |
| **1988/89** | 932.64 | *1047.726* | -115.086 |
| **1989/90** | 1169.94 | *1092.01* | 77.93 |
| **1990/91** | 1128.8 | *1166.193* | -37.393 |
| **1991/92** | 1304.1 | *1237.814* | 66.286 |
| **1992/93** | 1489.55 | *1260.461* | 229.089 |
| **1993/94** | 1260.72 | *1265.488* | -4.7675 |
| **1994/95** | 1068.33 | *1243.088* | -174.758 |
| **1995/96** | 1039.75 | 1225.062 | -185.312 |
| **1996/97** | 923.8777 | 1209.784 | -285.907 |
| **1997/98** | 905.9883 | 1196.294 | -290.306 |
| **1998/99** | 930.6618 | 1184 | -253.338 |
| **1999/00** | 934.4613 | 1172.526 | -238.064 |
| **2000/01** | 963.4717 | 1161.628 | -198.156 |
| **2001/02** | 1365.199 | 1151.142 | 214.0574 |
| **2002/03** | 1461.492 | 1140.956 | 320.5358 |
| **2003/04** | 1551.949 | 1130.993 | 420.9568 |
| **2004/05** | 1418.441 | 1121.196 | 297.2448 |
| **2005/06** | 1384.32 | 1111.527 | 272.7934 |
| **2006/07** | 1273.574 | 1101.955 | 171.6194 |
| **2007/08** | 1209.896 | 1092.459 | 117.4362 |
| **2008/09** | 1360 | 1083.024 | 276.9761 |
| **Totals** | | | £559.9557m |

Both maintenance and other operating costs show a clear reduction in costs since privatisation but the large increases in renewals out-weigh any benefit that this has so far achieved. The maintenance can be seen to have risen after the Hatfield Crash and although a reduction is still evident it is still higher than a counterfactual scenario. The total figure for the change in operating costs is therefore deemed to be:

***Actual Total Operating Costs – Counterfactual Total Operating Costs = £37818.0847(mil)***

Privatisation has clearly been a costly initiative for the Government and an excess of £37 billion has been paid compared to what may have occurred under a counterfactual scenario.

Table 6-12 and Table 6-13 highlight the changes in costs from the passenger operations perspective.

**Table 6-12 Cost of Train Operations**

| | TOC-own operating costs | CF TOC-own Operating Costs | AC-CF TOC Operating Costs | Rolling stock capital expenditure | CF Rolling Stock Capital Expenditure | AC-CF Rolling Stock Capital Costs |
|---|---|---|---|---|---|---|
| **1979/80** | 2706.818 | | | 352.47 | | |
| **1980/81** | 2739.735 | | | 401.25 | | |
| **1981/82** | 2717.029 | | | 312.83 | | |
| **1982/83** | 2502.13 | 2708.73 | -206.6 | 270.3 | 279.232 | -8.932 |
| **1983/84** | 2669.909 | 2719.253 | -49.3437 | 164.45 | 236.239 | -71.789 |
| **1984/85** | 3122.878 | 2644.76 | 478.1177 | 142.19 | 200.811 | -58.621 |
| **1985/86** | 2428.9 | 2623.558 | -194.658 | 181.6 | 182.051 | -0.451 |
| **1986/87** | 2282.94 | 2657.446 | -374.506 | 178.2 | 202.117 | -23.917 |
| **1987/88** | 2724.198 | 2709.959 | 14.23904 | 217.33 | 256.785 | -39.455 |
| **1988/89** | 2786.714 | 2748.131 | 38.58299 | 418.08 | 323.86 | 94.22 |
| **1989/90** | 3531.21 | 2798.989 | 732.2211 | 435.24 | 416.743 | 18.497 |
| **1990/91** | 2402.286 | 2870.987 | -468.702 | 559.3 | 533.358 | 25.942 |
| **1991/92** | 2818.133 | 2834.051 | -15.9181 | 729.33 | 617.618 | 111.712 |
| **1992/93** | 2908.99 | 2684.564 | 224.4258 | 832.35 | 650.492 | 181.858 |
| **1993/94** | 2232.561 | 2621.86 | -389.299 | 645.66 | 633.478 | 12.182 |
| **1994/95** | 3231.2 | 2628.005 | 603.1955 | 536.4 | 678.9679 | -142.568 |
| **1995/96** | 3122.741 | 2629.848 | 492.8936 | 288 | 724.6409 | -436.641 |
| **1996/97** | 4009.256 | 2628.988 | 1380.268 | 70.31106 | 770.4289 | -700.118 |
| **1997/98** | 3856.389 | 2626.371 | 1230.018 | 155.0577 | 816.2916 | -661.234 |
| **1998/99** | 3798.116 | 2622.578 | 1175.538 | 231.9187 | 862.2044 | -630.286 |
| **1999/00** | 3799.118 | 2617.978 | 1181.14 | 307.1094 | 908.1515 | -601.042 |
| **2000/01** | 4243.469 | 2612.812 | 1630.657 | 698.2857 | 954.1227 | -255.837 |
| **2001/02** | 4467.092 | 2607.241 | 1859.851 | 1143.528 | 1000.111 | 143.4168 |
| **2002/03** | 4851.89 | 2601.374 | 2250.516 | 691.0885 | 1046.112 | -355.024 |
| **2003/04** | 5047.138 | 2595.289 | 2451.849 | 913.0746 | 1092.123 | -179.048 |
| **2004/05** | 5217.937 | 2589.04 | 2628.898 | 1031.277 | 1138.14 | -106.862 |
| **2005/06** | 5434.768 | 2582.665 | 2852.102 | 624.2342 | 1184.163 | -559.928 |
| **2006/07** | 4994.736 | 2576.195 | 2418.541 | 351.9612 | 1230.189 | -878.228 |
| **2007/08** | 5012.455 | 2569.65 | 2442.806 | 416.755 | 1276.219 | -859.464 |
| **2008/09** | 6379.42 | 2563.045 | 3816.375 | 345.627 | 1322.252 | -976.625 |
| **Totals** | | | 28203.21 | | | -6958.24 |

**Table 6-13 Change in Total Passenger Service Costs**

| | Total Passenger Service Costs | CF Total Passenger Service Costs | AC-CF Total Train Operating Costs |
|---|---|---|---|
| **1979/80** | 3059.288 | | |
| **1980/81** | 3140.985 | | |
| **1981/82** | 3029.859 | | |
| **1982/83** | 2772.43 | 2987.962 | -215.532 |
| **1983/84** | 2834.359 | 2955.492 | -121.133 |
| **1984/85** | 3265.068 | 2845.571 | 419.4967 |
| **1985/86** | 2610.5 | 2805.609 | -195.109 |
| **1986/87** | 2461.14 | 2877.351 | -416.211 |
| **1987/88** | 2941.528 | 3014.877 | -73.3488 |
| **1988/89** | 3382.683 | 3132.679 | 250.0038 |
| **1989/90** | 4092.001 | 3276.42 | 815.581 |
| **1990/91** | 2961.586 | 3465.033 | -503.448 |
| **1991/92** | 3547.463 | 3494.568 | 52.89485 |
| **1992/93** | 3741.34 | 3363.137 | 378.2027 |
| **1993/94** | 2878.221 | 3335.58 | -457.359 |
| **1994/95** | 3767.6 | 3393.789 | 373.8108 |
| **1995/96** | 3410.741 | 3448.237 | -37.4953 |
| **1996/97** | 4079.567 | 3500.32 | 579.2467 |
| **1997/98** | 4011.447 | 3550.867 | 460.5801 |
| **1998/99** | 4030.035 | 3600.385 | 429.6501 |
| **1999/00** | 4106.228 | 3649.198 | 457.0302 |
| **2000/01** | 4941.755 | 3697.515 | 1244.24 |
| **2001/02** | 5610.62 | 3745.478 | 1865.142 |
| **2002/03** | 5542.979 | 3793.183 | 1749.796 |
| **2003/04** | 5960.213 | 3840.696 | 2119.516 |
| **2004/05** | 6249.215 | 3888.066 | 2361.148 |
| **2005/06** | 6059.002 | 3935.327 | 2123.675 |
| **2006/07** | 5346.697 | 3982.504 | 1364.193 |
| **2007/08** | 5429.21 | 4029.615 | 1399.595 |
| **2008/09** | 6725.047 | 4076.675 | 2648.372 |
| **Totals** | | | 19072.54 |

The TOC costs clearly show a large increase in costs that outweighs any reduction in rolling stock capital costs. The change in total passenger operating costs can therefore be seen as being increased from that expected under a counterfactual scenario and stands at £19.072 (bn). The final total industry costs are the sum of the operating and passenger costs. The total cost of running the railways from both an infrastructure and operating perspective are:

***£37.818 (bn) + £19.072 (bn) (using NPV 3.5%) = £39.84 (bn).***

All calculations are now completed and initial findings suggest that there has been a large increase in costs for the Government in the form of infrastructure maintenance and renewal and an increase in operating costs for the Operators that cover the increased access charges and regulatory costs.

The Welfare Benefit can now be calculated and will highlight the total cost of the privatisation policy impact to the industry stakeholders. The welfare benefit is calculated using the following formula:

***Change in Revenue – Change in Costs + Consumer Surplus = Welfare Benefit.***

This is shown in the following table of welfare cost/benefit (Table 6-14).

**Table 6-14 Welfare Benefit from the Privatisation Initiative**

| | **Tot Rev-Cf Rev = Change in Revenue** | **Ac Costs-Cf Costs = Change in Total Industry Costs (£bn)** | **Change in Consumer Surplus (£bn)** | **Welfare Benefit** |
|---|---|---|---|---|
| **1995/96** | 0.036309874 | -58.5816 | 0.131773969 | 0.226665 |
| **1996/97** | 0.061186417 | 704.6998 | 0.270442127 | -0.37307 |
| **1997/98** | 0.110593539 | 844.979 | 0.683567733 | -0.05082 |
| **1998/99** | 0.185335457 | 1098.581 | 0.940253241 | 0.027008 |
| **1999/00** | 0.257227667 | 1406.713 | 1.163465142 | 0.01398 |
| **2000/01** | 0.210026987 | 3244.485 | 0.99908348 | -2.03537 |
| **2001/02** | 0.231263209 | 5057.721 | 1.082886395 | -3.74357 |
| **2002/03** | 0.247215686 | 5699.124 | 1.117003312 | -4.33491 |
| **2003/04** | 0.268160598 | 7131.883 | 1.194868722 | -5.66885 |
| **2004/05** | 0.311802629 | 6593.924 | 1.370971951 | -4.91115 |
| **2005/06** | 0.354287019 | 5788.462 | 1.297966408 | -4.13621 |
| **2006/07** | 0.48159782 | 5036.847 | 1.905826591 | -2.64942 |
| **2007/08** | 0.572327953 | 5592.893 | 2.256542009 | -2.76402 |
| **2008/09** | 0.629765912 | 7460.908 | 2.578620396 | -4.25252 |
| **Totals** | £3.957100(bn) | 55076.68 | 16.99327148 | -34.6523 |
| **Totals using 3.5% NPV** | £2.84 | £39.84 | £12.34 | -£24.65 |

Overall, Table 6-14 shows that users are net gainers by around £12 billion over the 15 years since privatisation was instigated. This not an inconsiderable sum and the main reasons for this were discussed in the previous chapter – more train kilometres to be travelled, cheaper ticket prices, and in some respects an element of competition on some services. The industry loses by around £40 billion which is far in excess of any benefits that have been felt. However, within the industry there are some gainers. It has been shown that the private Train Operating

Companies have been profitable over the period (with average returns varying between 1.2 and 4.8% - TAS (2010)), with total profits around £1.62 billion (in Present Value terms). The main loser from the privatisation policy initiative then has been Government, with an increased exposure over the period of nearly £40 billion.

There are considerable losses in welfare of nearly £25 billion. These losses might be offset by the one off benefits of the sale of assets. However, Gourvish believes these may only amount to around £1.22 billion (2008 prices, Present Value) (based on Gourvish, 2002a) and, in any event, they should be considered as pecuniary transfers. It is also worth noting that transitional costs are still to be taken into account as these do not appear in the cost figures. These will be looked at in greater detail in the next section but tentative findings that the transitional costs of setting up the new organisational structure (including ORR, OPRAF and Railtrack) are estimated, on a comparable basis, at £0.65 billion (based on Harris and Godward, 1997). If these calculations are correct then the net balance to Government is thus only £0.57 billion.

If we consider the three post-privatisation periods outlined in the literature review, in the first stage (transition between 1995 and 2000) there was virtually no welfare change – by contrast Pollitt and Smith (2002) found a modest welfare improvement over a corresponding period. However, between 2000 and 2005 (post Hatfield period), there was a large welfare loss of almost £16 billion. The losses have started to decrease and the third post privatisation period (2005 – 2009) has also seen losses but these are falling year on year to with this reducing to a loss of almost £9 billion.

All totals are subject to a NPV calculation in line with the government recommended rate of 3.5%. At this stage of the calculations it is clear that the huge costs incurred since the privatisation initiative began have impacted on the benefits that may have resulted. Before the final calculations can be made the issue of income from sales of BR and the cost of the actual process must first be accounted for.

## 6.6 Transition Costs and Income from Sales

It was shown in the methodology chapter that the issue of transition costs is considered complex and problematic. Transition costs and the income or loss from sales must be included in the total cost structure but there are also on-going transaction costs that are incurred by both Operators and the Government that require fees for contractual agreements, consultancy and legal issues that may not be apparent in the data as individual costs.

Accounting for these costs in a longitudinal study such as this research has received attention but has been inconclusive (Preston 2002). Recent work by Merkert has attempted to apply specific costs across a time frame with interesting results – transaction costs change over time and events such as Hatfield increase transaction costs and for a significant time period (Merkert, 2010).

Disaggregating the costs included in this research even further to account for transaction costs was deemed unworkable within the time frame of the project. Transaction costs are already a feature of the different stakeholders and therefore the impact of these costs will be felt as a whole rather than seen as a separate cost. Transitional costs have been taken from the cost data and are dealt with in this section.

Transitional costs are those costs that are incurred as a direct result of the privatisation process and would not have been incurred if the railways had remained in public ownership. These costs are a loss to the government that cannot be recouped. Sale of items can be a benefit to the government – or Treasury – and are one-off items that cannot be gained (or lost) again. Calculating these costs has proven to be difficult. Accounting procedure and changes in ownership have resulted in slightly different results from each author that has been studied. The sale of many items started in the early 1980s and cannot therefore be taken as a cost/income due to privatisation since privatisation was not actually decided until 1992. The sale of items accounted for in the cost benefit will be those costs that occurred during the transition period and impact specifically on the railway operation and management. Gourvish (2002a) provides the most complete breakdown of sales and acquisitions for the privatisation initiative but it must be noted that some costs may also be included as transition costs and double counting must be prevented.

Table 6-15 gives a summary of the sale items during the privatisation initiative. All of the items in this table involved the exchange of currency and were either a profit to the Treasury or a loss. There were other minor sales during this period but the majority were small support industries specific to a local area with minimal impact on the balance sheet.

**Table 6-15 Railway Sales during the Privatisation Initiative**

| | Gross Sale Price £m | Net Profit £m | Gross Sale Price 2008 £m | Net Profit 2008 £m | Net Profit 2008 £m NPV 3.5% |
|---|---|---|---|---|---|
| **BRIS Infrastructure Maintenance** | 122.2 | 110.2 | 175.968 | 158.688 | 153.32 |
| **BRIS Track Renewals** | 43.4 | 30.6 | 62.496 | 44.064 | 42.57 |
| **BRIS Infrastructure Design** | 2.8 | -9.8 | 4.032 | -14.112 | -13.63 |
| **Freight and Parcels** | 247.7 | -134.2 | 356.688 | -193.248 | -186.71 |
| **Passenger** | 39.1 | 37.2 | 56.304 | 53.568 | 51.76 |
| **Rolling Stock Maintenance** | 32.6 | -29.6 | 46.944 | -42.624 | -41.18 |
| **TESCOs** | 2.4 | -0.1 | 3.456 | -0.144 | -0.14 |
| **S&T** | 208.5 | 190.5 | 300.24 | 274.32 | 265.04 |
| **Central Services** | 177.2 | 63.6 | 255.168 | 91.584 | 88.49 |
| **Totals** | 875.9 | 258.4 | 1261.296 | 372.096 | 359.51 |

Source: Sale prices taken from Gourvish (2002a)

The summary of sales outlines the actual sale price and benefit received but it should also be noted that there were certain sectors within BR that were transferred for nil consideration. Although these items may not have incurred a direct income or cost, they were worth a considerable amount of money and their worth must be accounted for as a cost. The most substantial of these industries was Railtrack. Railtrack became a government owned company on the 1st April 1994 in preparation for its floatation as a competitive company. Railtrack issued contracts for maintenance over 7 year terms with ever-decreasing cost levels which would provide the profit for the shareholders. Railtrack was first valued at £6.5 billion in 1994, although its directors argued that £3 billion was more realistic (Preston, 1996, p. 5). Railtrack was ultimately sold far more cheaply in 1996, however, at a share price of £3.90 which brought proceeds of only £1.9 billion (Crompton and Jupe, 2003). The company was considered to be worth far more by the market and only thirty months later the stock was valued at £16.05 a share (Gourvish 2002a).

Railtrack seems an example of an industry reorganised for political reasons and ease of sale rather than for organisational and operational benefit and this failure to address the important issues of sustainability meant all stakeholders eventually lost out at the point Railtrack was taken into administration. The total impact of the Railtrack saga is difficult to quantify due to the many stages the reorganisation and eventual sale took and it is also important to remember that just because money did not always change hands, there was a level of accounting balancing necessary. To this end the final gain from the floatation of

Railtrack is a combination of debt absorption, re-financing and sale income as shown in Table 6-16.

**Table 6-16 Companies Transferred for Nil Consideration and Eventual Cost/Income Upon Sale**

| Business | Effect on Balance Sheet | Sale | Net Profit/Loss | Net Profit/Loss £m 2008 | Net Profit/Loss £m 2008 NPV 3.5% |
|---|---|---|---|---|---|
| **Railtrack** | 142.7 | 1900 | 1442.7[35] | 2149.623[36] | 2,076.93 |
| **Channel Tunnel** | | | | | |
| **EPS** | -798 | | -798 | -1189.02[37] | -1,148.81 |
| **Union Railways** | -42.6 | | -42.6 | | |
| **St Pancras Station** | -25 | | -25 | -36[38] | -34.78 |
| **ROSCOS** | | | | | |
| **Angel Trains** | -619.4 | 528.3 | -91.1 | -131.184 | -126.75 |
| **Eversholt** | -681 | 696.3 | 15.3 | 22.032 | 21.29 |
| **Porterbrook** | -444.6 | 518.3 | 73.7 | 106.128 | 102.54 |
| **Sparesco** | -14.8 | | -14.8 | -21.312 | -20.59 |
| **Total** | -£2482.7 | £3642.9 | £560.2 | £900.267 | £869.82 |

Source: Sale prices from Gourvish 2002

Absorbing the debt by transferring the ROSCOs at 'no cost' to the government balance sheet, and then selling on at less than the debt, was seen by many as a mistake (Jupe, 2005). Within a couple of years of the sale of the ROSCOs the first railway millionaires were created as the share price rose and the companies were sold on at huge profits. This ultimately meant that the profit made from the sale of Railtrack was greatly reduced in the overall total profit and, when consideration is given to the opinion that Railtrack was sold at less than it was worth, the total profit made from the sale of goods was far less than what it may have been. It seems that the objective of providing income to the Treasury would not be achieved once the actual cost of the privatisation initiative was taken into account.

Accounting for transition costs – costs specifically related to the privatisation process – take into account the year from which privatisation was determined (1992) until all privatisation initiatives had been accounted for (Table 6-17). These costs included consultancy costs for the DTp, ORR, OPRAF, BR and Railtrack. Other costs, including redundancy costs and franchise bidding costs bring the total to double this (Harris and Godward, 1997). Estimations are based

[35] Includes £600m equity debt absorption
[36] Calculated from 1994
[37] As above
[38] All other prices from this point calculated from 1995

on the cost of setting up nearly 100 separate companies, staff relocation or redundancy costs, new infrastructure costs for both buildings and computer systems and general set-up costs. Transition costs can also be seen to include general staff time that is taken away from the everyday running of the business. Harris & Godward (1997), estimate that this alone would have cost in the region of £2bn. For the purpose of the cost benefit, costs need to be accounted for, but should also represent the final estimate based on grounded empirical evidence. The actual figure that has been attained as known costs, backed up by the National Audit Office (1997), as shown in the table below will be used.

**Table 6-17 Transition Costs**

| | RPI | Total Transitional Costs of Privatisation | Total Transition Costs 2008 prices | Transitional Costs at 3.5% NPV |
|---|---|---|---|---|
| **1992/93** | 155 | 5.5 | 8.525 | |
| **1993/94** | 153 | 104.4 | 159.732 | |
| **1994/95** | 149 | 158.3 | 235.867 | |
| **1995/96** | 144 | 184.7 | 265.968 | |
| **Totals** | | | 670.092 | 647.43 |

Source: Original costs from Harris & Godward 1997

Taking all these items into account the total income generated from privatising the railways is:

**Total Income (or loss) minus total transition costs = (£359.51+£869.82) - £647.43 = £581.91m**

This does not seem to be a huge sum of money when consideration is given to the cost estimation by other authors such as Preston (2000), Pollitt (2002), Crompton (2003) and Harris & Godward (1997) but as explained above, the figures are based on known transition costs and not estimated additional costs. The costs are also separate from the costs included in the accounts for British Rail that are included in the earlier calculations for cost benefit and it is assumed that some transition costs will be included in these totals.

Although not associated with transition costs or asset sales there is a desire to recognise the impact of other modes of transport and the impact of the demand for rail on the environment. The next section looks at these issues and draws conclusions as to how much of a cost or benefit there may be from these issues.

## 6.7 Environmental Costs of Privatisation

In order to calculate the environmental impact of the change in demand a consideration of a variety of different factors is needed. Ascertaining how many of the journeys were 'new' journeys and how many involved modal switch will determine whether there is an increase in emissions (new journeys) or reduction (modal switch). Accounting for the environmental cost of infrastructure and maintenance over its average life and accounting for any reduction in road building due to modal switch cannot be made easily. In general, the economy has been booming since privatisation and this will mean new jobs and therefore new journeys but it will also mean more disposable income and therefore more leisure journeys.

The reduction in car ownership of young people and general reduction in overall car journeys suggest that the rise in modal switch is fairly high. Trends towards downgrading to standard rail class from 1st class during the recent recession also suggest stability in rail rather than an exodus to road and the apparent fall in domestic air journeys and stability in rail figures seem to suggest that although there may be a reduction in journeys by rail by those passengers that came to rail during the boom years there may be an increase in passengers from domestic air that will maintain the consistency of the numbers.

As seen in the trends chapter of this research, the environmental cost models are fraught with anomalies and assumptions and therefore considered by many to be unreliable when deciding the total environmental impact over such a long time period. Environmental costs are considered important though, even more so than they were 30 years ago at the beginning of the research period. The environmental impact of infrastructure and mobility commands an important place in transport policy decision making and each new infrastructure project that is now considered includes an estimation of the environmental impact compared to either a 'do nothing' scenario, or a counter proposal (Flyvbjerg, 2007b, Bos and Vleugel, 2005, Pearce et al., 2006).

When looking at demand rather than infrastructure the inclusion of environmental factors is less secure. Whelan et al. (2010) do not include environmental factors into their model for estimating change in demand on the railways but use instead a fuel cost as a parameter by which modal switch can be seen. Aggregating environmental costs through a modal switch appears to be the better route forward for determining any impacts and it is therefore suggested that the estimation of modal switch and new journeys is taken from the generally

accepted demand elasticity calculations in the Demand for Public Transport: A Practical Guide (Balcombe et al., 2004).

The variables are split between an urban and inter-urban sector with the diversion rates for urban rail schemes being 33% of passengers switching from the car, and for inter-urban the figure is 60%. Considering the change in Long Distance travel has seen the highest increase the assumption is made that the percentage change to rail from car is higher than 33% and is estimated to be 46%. Rail is considered to be an environmentally friendly mode of transport compared to road and air therefore modal switch may well carry a benefit in terms of environmental impact, but there is also the cost to the environment from new journeys – especially leisure journeys or unnecessary journeys.

To calculate the environmental costs of train kilometre increases an average of the high and low marginal cost estimates were used. Bearing in mind that the costs and benefits are calculated over a considerable time period it was felt that this would smooth over anomalies and give the better average. Calculating the costs required the use of train kms as it is here that the actual impact to the environment is made whereas for the environmental benefits, passenger km is used. This determines the impact on the environment due to an increase in passengers lowering the impact of the train use thereby accounting for both costs and benefits.

Table 6-18 gives the parameters of environmental impact of transport.

**Table 6-18 UK Average Values of Environmental Factors (£s 2008 prices and values)**

| Impact Type | Coach | Car | Passenger Rail | Freight Rail |
|---|---|---|---|---|
| Noise | 0.02478 | 0.003186 | 0.14396 | 0.2006 |
| LAQ | 0.10974 | 0.006254 | 0.32922 | 0.19588 |
| Greenhouse Gases | 0.01652 | 0.00354 | 0.07906 | 0.15458 |
| Safety | 0.06136 | 0.01298 | | |

Source: (Balcombe, Mackett et al. 2004)

Using the 46% parameter to determine the passenger kms abstracted from car, the figure is then divided by a car mean load factor to get vehicle km. The marginal costs per vehicle km are then used to calculate the environmental costs avoided on the road (i.e. the benefits). Load factors are the amount of passengers that transfer from one mode to another. In this case the National Travel Survey suggests that the load factor should be 1.6 for general car use but only 1.2 for business and commuting. Considering the capacity of trains has increased

considerably on the commuter routes and peak times it was decided to average the load factors in favour of commuting and a load factor of 1.3 was used.

The parameters for TKm and PKm were calculated as the difference between the actual Km and the counterfactual Km:

**Ac(T/P)km – Cf(T/P)Km = change in (T/P)Km**

For calculating the costs to the environment the difference in TKm is used. Including the average marginal cost of vehicle Kms and multiplying this by the increase in TKm will give the increased cost and the environmental impact of the extra traffic. The parameters shown are from the Demand for Public Transport (Balcombe 2004)

**The average marginal costs = (high value + low value)/2 = (6.41+7.43)/2**

The results, and total cost and benefit, of the increase in passengers to the railways are shown to be of minimal impact: a benefit of £49 (mil) from modal switch but an overall benefit over the privatisation period of only £4.89 (mil). This is due to the counterfactual passenger kilometres being, for the first ten years (bar 1999), estimated to have been over and above that of the actual PKm. This underpins the impact of Hatfield on reducing PKm and the depression of the privatisation effect during the transitional period. It can be seen that the environmental benefits of passengers switching from road to rail are only recently having any impact – and the impact over the entire privatisation period is minimal.

Due to the minimal impact of the environment and modal switch it was deemed unnecessary to continue further into the research and the totals have not been included in the final cost benefit analysis. The final findings for the cost benefit analysis include the change in revenue, change in total costs, the consumer surplus and the addition of the transition costs and sale of assets. Table 6-19 shows the final totals that have been adjusted using a NPV at 3.5%.

**Table 6-19 Total Welfare Benefit**

| | Change in Revenue | Change in Total Industry Costs (£bn) | Change in Consumer Surplus (£bn) | Welfare Benefit £b |
|---|---|---|---|---|
| **1995/96** | 0.0363099 | -0.0585816 | 0.131774 | 0.226665 |
| **1996/97** | 0.0611864 | 0.7046998 | 0.270442 | -0.37307 |
| **1997/98** | 0.1105935 | 0.844979 | 0.683568 | -0.05082 |
| **1998/99** | 0.1853355 | 1.098581 | 0.940253 | 0.027008 |
| **1999/00** | 0.2572277 | 1.406713 | 1.163465 | 0.01398 |
| **2000/01** | 0.210027 | 3.244485 | 0.999083 | -2.03537 |
| **2001/02** | 0.2312632 | 5.057721 | 1.082886 | -3.74357 |
| **2002/03** | 0.2472157 | 5.699124 | 1.117003 | -4.33491 |
| **2003/04** | 0.2681606 | 7.131883 | 1.194869 | -5.66885 |
| **2004/05** | 0.3118026 | 6.593924 | 1.370972 | -4.91115 |
| **2005/06** | 0.354287 | 5.788462 | 1.297966 | -4.13621 |
| **2006/07** | 0.4815978 | 5.036847 | 1.905827 | -2.64942 |
| **2007/08** | 0.572328 | 5.592893 | 2.256542 | -2.76402 |
| **2008/09** | 0.6297659 | 7.460908 | 2.57862 | -4.25252 |
| **Totals** | £3.957100(bn) | 55.07668 | 16.99327 | -34.6523 |
| **Totals using 3.5% NPV** | £2.84 | £39.84 | £12.34 | -£24.65 |
| **Income from Sales**<br>**Sale of Transfers**<br>**Transition Costs** | 0.35951<br>0.86982 | <br><br>0.64743 | | |
| **Totals** | **£4.07** | **£40.49** | **£12.34** | **-£24.08** |

The final totals are not dissimilar to the costs and benefits that were already suggested in the original change in welfare. This underpins the assumption that income from sales may have been an original incentive when privatising the rail industry, but, due to the political wrangling and apparent need to privatise regardless, the impact of sales, after the reduction from transition costs, has had very limited impact on the balance sheet (Gourvish 2002).

The welfare benefit is calculated using the formula:

**Change in welfare = change in revenue – change in total costs + consumer surplus**

The actual welfare benefit from privatising the railways can therefore be seen as:

**Welfare = £4.07 (bn) - £40.49 (bn) + £12.34 (bn)**

**The Total Welfare Benefit = £-24.08 (bn)**

It can be seen that earlier predictions of some of the losses being offset by the sale of assets has not occurred. The previous tentative findings of losses and gains still stand – the Users are

the main beneficiary and the Government the main loser. It we assume there is a deadweight loss of this additional public burden and that the shadow price of public funds is around 1.20 (after Dodgson and Topham, 1987), then there is an additional welfare loss of £7.6 billion to take into account (Dodgson and Topham, 1987).

### 6.7.1 Conclusion

There has been significant disbenefit from the privatisation initiative and the areas and stakeholders that have been affected by this cost have been briefly explained during the analysis. The conclusions that this chapter draws are neither definitive nor all consuming – there are many explanations and scenarios that could have impacted that may not have been accounted for. The counterfactual scenario that has been developed as part of this research has provided results that may appear contentious. The estimated rise in both TKms and PKms over and above that which has actually occurred means that some of the impacts derived from the data are less than it may have been thought – the environmental costs and benefits are an example of this.

There is an overall disbenefit from privatising the passenger rail, but this will hardly come as a surprise as the costs have long been an issue for the government. The benefit to consumers is considerable at £12 (bn) but had the Hatfield crash not occurred this could have been even higher. Whether Hatfield is the main cause of the large increase in costs is less certain as the costs have increased both before and after the impact of the crash was affecting the trends.

What this exercise has shown is that there are specific trends within the data that help towards an understanding of the results and many lessons that can be taken from the initiative. The following chapter takes forward the analysis and examine it in relationship to the work carried out by others and suggests areas for additional work.

# 7 Conclusion and Further Work

## 7.1 Introduction

The rail industry has been seen to be a large and complex industry that has undergone continual organisational change as well as changes in focus and business direction. The industry has also been subject to impacts from changes in policy, the economy, and consumer behaviour, and estimating these impacts on the amount of passenger kilometres travelled each year has been a difficult task to achieve. The results that have been found are subject to the data variables that were included and these were also conditional for their availability and ability to represent that for which they were chosen. Due to the strength of feeling and varied opinions on the privatisation issue the results may be seen as fairly contentious and will – as they have already – be questioned for their relevance to the impacts on the rail industry.

The research process for this particular thesis has been a journey of discovery that has continually formed and reformed the depth and breadth that the thesis has been able to take. Opportunities have been available to question the path that has been followed with various industry experts and some of their opinions will be used to either uphold the findings or to offer suggestions for further work. As it was pointed out in the beginning of the thesis, this was not intended to be an exercise in econometrics but rather to use econometrics as a tool to aid the understanding of the effect of privatisation on the industry. The narrative surrounding the rail industry has been important and the research results are only considered definitive when related to this account.

To conclude this thesis the final chapter will look first at drawing together the findings of the analysis. This will include comparisons to other research that has been carried out and the compliance to the theories and ideologies of privatisation. The main contentious issue in this thesis is the counterfactual scenario that has been developed. It is important to remember that the findings are only as good as the counterfactual they are compared to, therefore there will be a dedicated discussion on the justification of the method and findings of the counterfactual. The final section to this chapter will consider the policy implications of this research and recommendations for additional work from both a personal and industry perspective.

## 7.2 Discussion of the Main Findings

The main objective of this research was to analyse the literature surrounding the rail industry over the last 30 years and to calculate, with the aid of a simple regression model using cost benefit analysis, the impact of privatisation on the passenger rail industry. The main objective has essentially been met – the data variables were chosen, the model developed, calculations made, and a narrative designed to explain the findings was given. Whereas many cost analyses of the privatisation impacts have tended to focus on short term findings and the impact of events such as the Hatfield Crash (Smith 2006), this research has been able to look beyond this and to see the privatisation process from a broader perspective. Through the development of the model it has been found that the Hatfield crash had a long lasting effect on the passenger rail industry that extended further afield than just the Hatfield area. The impact was also diverse in that it affected not just the infrastructure and associated impacts such as passenger and train kilometres and resulting costs and revenues, but it also signalled a change in the industry structure and focus for rail travel. The recovery from the incident occurred during a time of increasing fuel costs and road congestion as well as a greater awareness of the environmental damage that transport modes can have and it is evident that this may have contributed to a switch to an alternative transport mode such as rail.

The model that was developed suggests that privatisation depressed the demand for rail travel between 1992/93 and 2005/06 by around 8%, whilst Hatfield further depressed demand between 2000/01 and 2006/07 by an additional 5%. The strikes in the early 1990s reduced demand before the privatisation initiative was brought in by 6.1%. These findings are similar to those developed by Whelan et al. (2010) although there it appears that the TKm and GDP may be affected by multicollinearity. These findings suggest that the transition phase of the initiative was fairly far reaching in its impact on the network. This coupled with the impact of Hatfield has led to a suppressing of the amount of passenger kilometres as shown in the actual, predicted and counterfactual passenger kilometres graph (Figure 5-8). Recovery, and an increased in PKm over and above that determined by the modelled counterfactual, started to occur after 2000 but only rose considerably further after 2006/07. Since this time, passenger kilometres have increased beyond the expected counterfactual which has been identified as reaching a plateau and stabilising.

The main findings of the research can be identified by the totals in the final cost benefit table (Table 6-19). In general terms:

1. Rail passengers have benefited by £12bn.
2. Train operators have benefited in terms of revenue by £4bn
3. Train operations are more expensive than the pre-privatised era by £40bn.

The big loser has been Government (and ultimately the taxpayer) as costs have increased dramatically. In 2008 prices, the analysis indicates that total industry costs increased from around £6.5 billion in 1994/5 to £13.9 billion in 2008/9. This is an increase of 114% and cannot be explained away through over pricing, bad accounting, or increased labour and material costs. Traffic has increased over this period as well – train kilometres increased by 39% indicating a unit cost increase of around 54%. The reasons for this increase are something of a puzzle as they are roughly in line with the finding s of Smith (2006), but there does not seem to be a simple explanation provided in the literature. The 1992 White Paper did not set targets but it was the intention that industry costs should reduce as private sector disciplines were brought to bear. Although this did seem to happen initially, at least for train operations (Cowie, 2001, 2009), these have reflected the winner's curse and subsequent cost increases were therefore inevitable (Preston, 2008b). This depicts a plausible conclusion to the impact of privatisation on the rail industry and can be attributed to various events and challenges that have occurred. The next sections will look at each stakeholder in turn.

### 7.2.1 **User Benefits**

The increase in user benefits is only partly due to the lower fares that have occurred as a result of privatisation. The benefits that have manifested over the last 15 years have included better carriages, increased punctuality, security, and ease of modal integration. It is interesting that in many respects, lower fares are something that many rail users would dispute. It needs to be clarified, therefore, that lower fares are based on the expected rise in fares that would have occurred if the industry had remained in public ownership and, although may appear higher if compared to other rail industries, had the industry remained in public ownership the fare increases would have been over and above that which has been seen under privatisation. This is substantiated by the Conservative Governments original proposal to privatise the industry in order to turn a profit – but not, necessarily, to increase the service provided.

The increase in the quality of service was difficult to integrate into the methodology due to a lack of usable data. Punctuality was badly affected by the Hatfied crash and the punctuality prior to this event (but post privatisation) was also down on the pre privatisation levels. It has been explained that the regulatory controls put in place to encourage punctuality were also

problematic as they encouraged the cancelling of late trains and led to an increase in trains cutting out stations. Once these issues had been addressed, through the refining of the regulatory contracts, the quality of the service was seen to improve. Reductions in staff – especially in the beginning of the privatised industry – had a detrimental effect on service and many stations were left unmanned. These issues have also been addressed in recent years and coupled with the security improvements the general user experience has been seen to improve.

The ease of modal integration has been achieved through policy initiatives by local and metropolitan contractual agreements and could be seen as something that could have occurred regardless of the privatisation policy; as prior to privatisation the local councils had a greater control over the buses. It is a feature of both the privatisation of the rail industry coupled with the deregulation of the bus services that have provided the incentive for private operators to link services – especially where the private operator holds a rail franchise as well as a bus contract. This is as much about increasing patronage on buses as it is about improving rail service, and the inter-modal ticketing initiatives can be seen as a win-win for both bus and rail when they succeed. The problem with the privatisation and deregulation of the transport industry is that the policy of integration will only occur if it makes commercial sense (Potter, 2010).

There is an argument that technology has increased the opportunities for improving service quality and that many of these technological improvements would have been carried out under a nationalised industry. It must also be pointed out that the fragmentation of the service has meant that some technology could have been slower to arrive due to the inability to roll out wide spread changes across the different franchises. This has been found to be true of operators and ROSCOs where the collective methodology for creating innovation can only be instigated across specific projects and not network wide (Lovell et al., 2011). This raises the issue of franchise agreements' and the bidding process in general. Any improvements identified in franchise bids are tightly controlled for cost and the time frame for delivery does not allow flexibility for a change in direction unless the changes identified outside of the bid agreements bring increased revenue to counteract any costs. User benefits can therefore be seen to have been achieved despite the problems associated with horizontal separation.

An aspect of passenger rail travel that remains controversial that is also a direct result of the privatisation initiative is fare structure. TOCs can charge for fares outside the regulated fare structure for many routes and discounted travel on advanced tickets is a common incentive

used by franchises – especially in areas where there is on-track competition. The recent inquiry into fares by the House of Commons Transport Select Committee (2009) identified issues of access to cheaper fares and a lack of commonality surrounding ticket sales between operators (TSC 2009). Although this can be seen as a disbenefit to those consumers unable to access the promotions it is a benefit to those that can.

There have been obvious improvements in the user experience due to privatisation that are a product of competition and the regulation that is in force to maintain fairness and social responsibility. Whether this is political in the respect that it is more common for the socialist Labour Party to engender a higher social service than the Conservatives, and it has been a Labour Government for more than two thirds of the post privatisation era, it is difficult to quantify. The Conservatives were clear in their objective of commercialising the railways, in order to increase efficiency and reduce costs without increasing the service provided, and it can therefore be argued that it is the Operators themselves who have increased demand, through increased service, in their attempts to increase profits in the face of strict regulation.

Service quality, in the form of PPM, may not have increased or become standard across the network to the degree that passengers might have hoped, but the theory of property rights and the principal agent problems that underpin the theory of privatisation have become and additional threat to the profitability of the industry. This will be considered in greater detail in the next section when the relationship between the Operators and the Government is considered. Not all of the user benefits have been due to the privatisation initiative and distinguishing between the effects of outside impacts – such as congestion and fuel costs – is an area that will require additional research.

Users have clearly benefitted overall, in part due to regulated fares that are lower than they otherwise would have been, but perhaps also due to innovations introduced by the private sector, such as new services and tickets and changes to retail distribution (in particular telesales and web-based sales). Further analysis breaking down the benefits to users by service group would be a suggested route for additional research as it is clear that some services have performed better than others, but it seems likely that London and South East commuters will have been the big winners from fares regulation.

### 7.2.2 Train Operators

The franchised train operators have seen an increase in benefit since the privatisation initiative – approximately £4bn of profit when compared to the counterfactual. This is

particularly surprising when you consider that operating the trains under a privatised structure has seen increased costs that have not been counteracted by the increased demand. Foster (1994) believed the move from a monolithic state system of command and control to a market driven contractual system would lead to cost reductions whereas Preston (1996) raised concerns over the likely increase in transaction costs. Merkert (2010) estimates that for Train Operating Companies transaction costs increased as a percentage of operating costs from 2.9% in 1996/7 to 4.3% in 2007/8 (Merkert, 2010). The profit to the Operators has therefore been achieved despite the fares being kept lower than a counterfactual and the increases in costs for operating the railway being above anything that was anticipated. This additional cost has had to have come from somewhere, and it is here. In the politics and economics of running a social transport system under a commercially viable umbrella, that the theories around property rights and principal agents have been sorely tested.

During the first transition phase of the railway privatisation initiative (1995/56 – 2000) almost half of the franchises failed to control the contracts they were granted and subsequently failed. Evidence has suggested that the Principal (Government), with little knowledge of how to deal with this phenomenon, either renegotiated, or agreed to break the contract with the Agent (franchisee) without penalty (TSC, 2009b). This led to the perception by Operators that failure was an option and, if not attractive was without cost, therefore Operators could attempt to turn a profit in a manner that they may have not considered if the result meant larger costs (Jupe and Crompton, 2006). The theory of principal agent problems is based on a ‘tug of war’, or desire to achieve a balance, and the rail industry has seen a continual attempt by Operators to push for more control and a reaction by the Government to increase regulation in order to retain a balance. In effect, the balance has been more in favour of the Government, with regards to controlling the railways, even if it has come at the cost of increased subsidy, as the DfT has regained power over the franchise contracts with a balance on cost of the infrastructure sought through a three way control between the ORR, NR and the DfT.

The Operators of the trains may well feel they are being cornered regarding the lack of control they have over many aspects of the train operations (although the franchising process has now started to address this) and the initial problems have had a distinct impact on their activities. Operators do not own the track they use, the trains they operate or (in many cases) the stations they stop at. This led to a lack of choice and therefore control over costs regardless of the agreed bid specification (Preston, 2000). The problems that have been

identified with rolling stock availability and the increase in the cost of leasing has meant that the replacement of rolling stock has taken a lot longer to happen than was originally desired by the government. This seemingly continual tightening of regulation and depth of specification could have led to an increase in creativity as the Operators sought innovative and sometimes detrimental ways of securing a profit, but, it can also be seen as a product of the principal agent problem as the further the Operators pull away, the more the Government has pulled back. This also underpins the theory of who the actors and principals are – shareholders, suppliers, consumers etc. have all been seen to play a part in the seemingly lack of control over costs.

The operators appear to have overcome many of the obstacles that have been a product of the privatisation and subsequent regulatory initiative and, although many of the original franchises failed, they are continuing to turn a profit. The research into TOC costs and profit margins has suggested that an aggregated profit has been returned each year – even though some operators have recorded a loss. One of the biggest costs for the TOCs is the access charges that they pay for operating on the infrastructure.

Finance for infrastructure investment in UK rail networks is currently sourced through Network Rail (through a mixture of track access charges paid by the train operating companies and the Network Grant, paid directly by government to Network Rail), through the PTE's and through the Northern Ireland Integrated Transport Operator, both of which are dependent on levels of funding determined in the Comprehensive Spending Review (CSR). For Network Rail, the network grant accounts for approximately 82% of their revenue in 2009/10, this is scheduled to decrease to 72% over Control Period 4 (CP4, the regulatory period running from April 2009 to March 2014) due to compulsory cost reductions and control of overspending (ORR, 2009a). Research by the Association of Train Operating Companies (ATOC) suggests that by the end of CP4 many train operating companies will be covering their operating and full infrastructure investment costs independently, regardless of the Network Grant paid to Network Rail (ATOC, 2009). This is not necessarily backed up by the literature (Wheat and Smith, 2008, Smith and Wheat, 2007), but may be due to an inability to assess the true costs compared to the expected costs (Calvo and De Oña, 2012)

Operators have also found other ways of generating revenue streams and it has been seen that fines payable by Network Rail for over-runs on maintenance and renewal coupled with charging for additional extras such as car parking and upgrades have helped to increase the profit margins. The issue of competition within the industry rather than with other transport

modes is an area that would benefit from further investigation for the impact on profit as well as customer service that this change of vision would generate. This is tied in with the franchise agreement system and the short term vision that operators have had in the past. Security of tenure and motivation to invest has not been a significant feature of rail franchises – especially as so many franchises failed to renew their contracts after the first round. Now this trend has been seen to reverse – Southern franchise was renewed by the incumbent recently – it would be interesting to see if this impacts on the focus and service provision and if a change in the direction of competitive vision towards increasing overall transport modal choice is becoming evident (Smith et al., 2010).

Although these may provide many explanations as to how the Operators have managed to retain a profit in the face of increasing operating costs it does not go far in explaining why these costs for operating the railway have increased to the extent that has been seen. There could be the possibility of double marginalisation – where monopolies are created both up and down stream leading to excessive rents – but due to the regulation of track access charges this should not be the case (Preston, 2008b). Another explanation could be found in the losses generated through horizontal and vertical economies of scope (Alexandersson et al., 2008). Ivaldi and McCullough (2008) – although looking at US freight railways which are unlikely to be transferable to British passenger railways – found that there could be a 20% to 40% loss of technical efficiency if operations were separated from infrastructure and a 70% reduction if on-rail operations were separated (Ivaldi, 2008). Moreover, other studies have mixed findings with respect to the impacts of horizontal and vertical separation (Mizutani and Uranishi, 2011).

This goes some way to explaining the possible reasons for the Operators being able to turn a profit even though their costs have risen considerably, and further underpins the large increases that have been applicable to the Government.

### 7.2.3 Train Operations

One of the reasons for privatising the railways was to remove the interference of MPs in the everyday running of the industry and for this, privatisation was successful. The main drawback from a government perspective has been the loss of control over the budget in the sense that the Treasury was previously able to cancel or reduce the amount of investment into rail projects under the nationalised regime – if and when the economic need arose - but due to privatisation and the contracted agreements now in place the choices for doing this have become limited. The railways do not consist of just one company now and any radical changes

affect many privately owned companies who have specific contractual agreements with the Government, therefore, changing the parameters of these agreements could cost more in compensation than the savings that would be made. This could be seen as a negative impact imposed by the theory of property rights. Divesting of the right of ownership in order to secure increased efficiency leads to an inability to control the financial implications of contractual rights.

There is also an element of political stance having changed. The Governments of recent years have taken a policy stance of major long term infrastructure projects being a benefit to the economy in the long run and are no longer prepared to use them as a means of withdrawing from the commitment in order to save money in times of crisis (Whelan, 2008). Even taking these policy changes into account, there can be no denying the calamity of cost increases in the rail industry, and no discretion for changes in accounting procedure can justify the exponential increases in maintenance and infrastructure renewal that have been evident over the last 15 years.

This research has found cost increases of £40 (bn) over and above that which should have occurred under a counterfactual nationalised industry. It appears that the costs during the franchising transition were inordinately high, and this can possibly be attributed to no-one having the incentive to keep costs down (Gourvish 2008). The act of franchising and taking on the management was more than enough to deal with and therefore cost efficiency may not have been the main priority in the beginning. A counterfactual scenario would therefore have seen the OfQ initiative keeping a tighter rein on the costs and, coupled with the expense of privatising, the increases in costs due to the transition would possibly have been avoided. Sales of assets were also below market price, in many instances, and this reduced the amount of income from the transfer of ownership and increased the overall cost of the privatisation process.

This is an example of pushing through a policy against severe opposition from other stakeholders. It seemed that, in the end, privatisation would be achieved at any cost (Gourvish 2008). That said, there is evidence that the opposition was not as conclusive as it appeared (Engle 2011); laying argument to the Labour Party allowing privatisation through because they could see no other way of reducing the liability in order to regulate according to their own policy plans. What was not anticipated was the Hatfield Crash and subsequent infrastructure inadequacies that negated any chance of achieving efficiency and reduced costs. It is also interesting that the Thatcherite policies lived on for many years after Margaret Thatcher had

resigned as Leader and John Major took over as Prime Minister. It is this testament to the strength of the New Right and the radicalism of policy change that ensured the privatisation of rail would go ahead in one form or another (Glaister, 2004).

It has been explained that the lack of comparable industry transfers meant that all stakeholders went through a steep learning curve where understandable, if sometimes unacceptable, mistakes were made. Many of these were part of the franchise bidding process and the apparent lack of sustainability that the original agreements formed. Increasing subsidies have been a major part of the privatisation initiative and an area that requires further investigation. Bail-outs of struggling franchises and increased support were common in the beginning of the process, and this increased the pressure on the subsidy requirements and also meant operators could view failure as an option (Preston 2000). The Government did not want the privatisation process to fail, and allowing franchises to 'go-to-the-wall' was not conducive to a successful privatisation process. This can be underpinned by Principal Agent Theory and shows a costly settling down period where control appears to be both desired and scorned in equal measure by both principal and agent. The recent change in trend and promise by the DfT that franchises will not be bailed out has signalled a greater control over the rail investment by the Government (TSC 2009).

The recent report by McNulty (2011) has indicated that cost savings of 30% are feasible for the British rail system (McNulty, 2011). Based on the calculations made in this thesis, this would amount to savings of some £4.2 billion in 2008/9 and would be almost exactly the same as the welfare loss for that year. Even if these are achieved, there is a considerable way to go before costs can be brought down to the pre-privatisation levels and the evidence suggests that a 30% decrease would not be sufficient to maintain the railway at no cost to the taxpayer.

There is little disagreement regarding the causes of the increases in maintenance and renewal that has been seen since the privatisation initiative; what is puzzling is the amount of increase that has been seen. The cost of contracting out the activities has come with little increase in benefits and costs are far higher for very little extra (Gourvish 2008, Flyvbjerg 2007a). There has also been a recent debate in the European Parliament on unbundling (Shaw, 2000), which increasingly seems to conclude that separation of infrastructure from operations is expensive and ineffective at generating competition. The actual costs per train kilometre have fallen but when compared to a counterfactual scenario this is not effective enough to account for the added expenditure that has been seen in the renewals and enhancements. Maintenance costs

have fallen though and, apart from the increase after Hatfield, the steps taken by the ORR to further reduce maintenance costs appears to be having an effect on the costs per TKm. It was pointed out by Smith (2006) that for costs to reduce to a level comparable with the pre-privatisation era significant future reductions would have to be made that is not apparent in the plans for future funding and support.

The large cost increases can therefore been seen as a product of both political and economic failure and a lack of insight into how adaptable the policy initiative that was chosen would be for future Governments and social needs. The calculations that underpin this argument are only as good as the model that was developed therefore the next section will look at justifying the claims that were made during the research process.

## 7.3 Justifying the Counterfactual

The counterfactual argument is probably one of the most contentious issues to come from this research. Developing a counterfactual argument is, as it has been shown in the literature review and methodology chapters, an attempt at attaining a balance between plausibility and justification. The counterfactual should be a plausible scenario but also developed methodically using accepted methodology. Justifying the resulting scenario is equally important for the counterfactual to be accepted. There has not been a rail industry anywhere else in the world that has instigated such wholesale vertical and horizontal separation in such a short space of time, therefore 'like to like' comparisons has not been a possibility. Comparing the rail privatisation initiative with a different privatised industry has previously been found to achieve comparisons of productivity trends and not levels of productivity (Smith 2006). Developing a counterfactual scenario is therefore the most desirable option for comparison but also the most suggestive and possibly controversial.

Providing a descriptive analysis of the resulting scenario can be difficult if the change in focus and direction a counterfactual may have taken also changes – the change to an integrated transport policy and change in government is an example of this. The choice of using moving averages to determine the future based on the past was a methodology that was known to be fraught with difficulties (Harvey, 2006, Collopy, 1992). This is especially true over a long time period when subsequent events that impact both directly and indirectly on the industry may have altered the path a counterfactual would have taken. Using moving averages is also a justifiable methodology when consideration is given to the fact that the counterfactual is essentially a 'do nothing' scenario which, ultimately, is exactly what keeping the industry

nationalised would have meant. The counterfactual that has been depicted here is based on the actual GDP and estimated TKm and RevPKm giving a predicted counterfactual PKm. The actual GDP has been strong throughout the privatised era and this, along with a rising TKm and RevPKm has shown that the amount of passenger kilometres travelled under a continued nationalised industry would have risen. This is not necessarily what would have been planned for the industry but considering the events over the last 15 years it is plausible.

Congestion and fuel price increases would have occurred under a nationalised industry – and if the rail industry had not improved its service quality there could have been increased congestion due to a less attractive and costly rail industry discouraging new patronage. Environmental awareness would also have become an issue for both the government and the general public and more sustainable transport would have remained an issue (Balcombe et al., 2006). The economy would have continued to have grown as it has been seen to do and commuting would have increased. The problems of air travel – increased security and fuel prices – would still have impacted, and the train may still have become an attractive modal choice when consideration is given to all of these factors.

The argument for not including the Hatfield crash as an impact in the counterfactual has been argued and justified in this thesis, and it is a generally accepted that Hatfield was a product of privatisation (Knowles, 2004, Smith and Wheat, 2007). That said there are arguments for Hatfield being a product of the industries nationalised past and that the problems with infrastructure maintenance were inherent to the large infrastructure and lack of investment over a long period. Another narrative would therefore be to focus on the possibility that the counterfactual failed to take into account the role of historic underinvestment. The counterfactual assumed that infrastructure renewal costs would remain broadly constant – a product of moving averages – but the reality is that they increased strongly after privatisation and accelerated after Hatfield and are continuing at relatively high levels. This could be seen as the market correcting decades of underinvestment by the inefficient nationalised railway and a substantive explanation for the so-called cost explosion. Counter arguments here might include the nature of the initial infrastructure contractual regime that encouraged renewals over routine maintenance, the large increases in the unit costs of renewals under Railtrack and accusations of gold plating by Network Rail (Preston, 2002, Preston, 2008a).

The main findings have been interesting and controversial for a number of reasons. The argument for where British Rail would now be if it had not been privatised is subjective and, it has been found that for those who worked in the industry at the time, the opinions appear to

vary. British Rail had different business models for each of the sectors that took into account the individuality of the organisational and operational structure of each sector. This scenario could not be adapted for this research as it looks at the industry as a whole and uses long term data to forecast into the future rather than looking at a smaller region and a shorter perspective

A recurring theme in this research has been that of the Organising for Quality (OfQ) initiative that was instigated prior to privatisation and appeared to have made a positive impact during the short time it was in operation. There was a desire to try and ascertain the impact of the OfQ initiative as part of a counterfactual scenario within this thesis. In many ways this has been achieved through the counterfactual and the inclusion of the small but possibly significant changes that took place over the short space of time that OfQ was operational. OfQ was the first attempt at putting business into the focus for the management structure and for the first time money and decision making were in the same place. Customers become the main focus and commercialisation saw staff reductions and what was seen as the deskilling of the workforce as automated processes and technology advances took over from the previously labour intensive roles of train driving, station management and guardsman. OfQ also provided the vehicle for the franchise routes in the subsequent privatised industry as most of the franchise routes were devised from the OfQ routes – with the main exceptions being the east and west coast routes.

The impact of OfQ has not been easy to estimate due to the lack of research on the initiative and the very small time frame that it had to make an impact before privatisation was initiated. Although privatisation did not occur until 1995 – and OfQ had been effective for nearly five years by this time – the fact that privatisation was decided in 1992, and the impacts have been seen to have been felt from this point forward, has meant the OfQ initiative has been pushed into the shadows. When opinions have been sought on what the industry made of the initiative and potential continued impacts if nationalisation had continued there were differences of opinion. To some, the OfQ initiative was just another attempt at commercialisation that would have produced similar results to all other initiatives – in other words, the impacts would have fallen short of the expected and a reorganisation would have occurred again in a few years (Engle, 2011, Riley, 2011). To others there seemed to be a feeling that this was a major attempt at tightening the organisational and operational structure and the impacts would have been significant and long lasting (Whelan, 2008).

Developing these opinions further and exploring the impact of OfQ would be an interesting topic for future investigation.

One area for consideration with the counterfactual scenario and OfQ may be in the transition costs. It has been found that the costs during the franchising transition were inordinately high possibly due to no-one having the incentive to keep costs down. The act of franchising and taking on the management was more than enough to deal with and therefore cost efficiency was not the main priority in the beginning. A counterfactual scenario would therefore have seen the OfQ initiative keeping a tighter rein on the costs and the savings made, coupled with the expense of privatising, would possibly have been avoided.

The OfQ initiative and its impact on the counterfactual and were considered to be important but investigation has found that the impact was not as influential as previously thought.

## 7.4 Recommendations

Pawson (2002) suggests that caution should be maintained when carrying out statistical analyses of data and 'ruthless arithmetic extraction of net success' (Pawson 2002 p356). It is recommended, therefore, that the findings of this research are taken for what they are: an account of the costs and benefits of the rail privatisation initiative as compared to a modelled and justified counterfactual scenario. Sensitivity tests should now be carried out to determine the robustness of the model, paying particular attention to the base year that was chosen and the recent work by Whelan et al. (2010).

Sector analysis would further explain the anomalies that have been found in the different variables included in the research. Disaggregating the data into sectors and even ticket type may provide further insight into where the costs and benefits have been felt the most. It may be that future research could focus on this issue of a counterfactual scenario and look to develop different scenarios based on the different sectors. The main reason that this path was not taken during this research was due to the lack of data consistent with sector analysis – the costs could not be easily broken down into sectors due to the method of collection therefore the only method that could have been used in this research would be to look at the benefits and to discover which sectors had benefited the most.

It was also apparent during the research how important the legacy of the Hatfield crash has been on the whole of the industry. Although it was decided, based on rigorously researched findings, that Hatfield was a product of the privatisation initiative, it would be interesting to

test out the impact if it was assumed, as it is by some that Hatfield is routed in the nationalised era and would have occurred in some form or another eventually.

The increases that have been seen in subsidy over the research period are considerable and worthy of additional research. It has been explained here that the 'tug of war' that ensued between the Operators and the Government is a product of the principal agent problem and the difficulties with the initial franchising process has meant that additional funds have been used to increase the stability of the privatised structure. Although the work of Cowie (2009) looked at the initial round of franchising, to what extent these subsidies have been necessary and whether savings could have been achieved through the utilisation of other regulatory methods would be an interesting topic to consider (Cowie, 2009).

Another interesting area of research that could be a developed as a progression from this thesis is the development of a qualitative counterfactual. Although this idea was explored in the latter stages of the research analysis it was quickly discovered that developing a qualitative analysis based on the actual events that have occurred would be even more subjective than the counterfactual that has been offered and, unless significant time and resources could be available to ensure the depth that was necessary to clarify and substantiate the evidence could be found, the argument would not be convincing. The benefits of undertaking such a task would have ensured specific events and impacts, that may not have been included in the variables, were accounted for, but, the determination of the amount of impact would have been subject to increased scrutiny. Developing a storyline to narrate the data may give the analysis of the privatisation impacts greater depth but whether this would achieve a greater understanding of the costs and benefits that have been felt is less certain. This is certainly an area of research that could be followed on from this thesis and developed for comparison.

Due to the additional research that would be needed to underpin the results of this research further the policy recommendations are limited to observations of current changes. Competition was an aim of the privatised rail system and this has not proven to have been successful. Some of this may be due to the Conservative Government backing down on open access in the original franchises but this could have been remedied in later years. The political nature of the sector means that compromise is continually sought and any idealist remedies to increase profitability and competition end up diluted, and therefore less successful. There does seem to be a sense that competition for the market has been substituted for competition within the market (Shaw 2000).

Operators have shown the ability to ensure profits in the face of rising costs and could be influential in determining a reduction in costs for the infrastructure. It has been seen that the one franchise that does have infrastructure responsibility (Chiltern) has performed well in the time it has had. A move to longer franchises would give Franchisees the opportunity to invest in their franchise rather than act like the tenant they currently are.

The research in this thesis has raised many more questions than it has answered, and although it provides a significant insight into how the privatisation initiative has impacted on the increase in passenger demand, it has also raised issues around the relationships between politics, economics and the public will. The final section of this research will conclude on the thesis as a whole.

## 7.5 Conclusion

The modern control and perception of the railways is heavily embedded in its history. The current regulation of the railways still stems from the 1845 Railways Act (Jordana and Levi-Faur, 2004). The railways have always been politically controlled and although the structural changes to the railways management may seem to have been a natural economic and businesses decision any changes have always been routed in politics (Glaister, 2004). Franchising was fairly radical and untried in the format that was chosen and therefore mistakes had to be made for lessons to be learnt – unfortunately this came at the cost to the franchisee, but, ultimately the Government and therefore taxpayer. The privatisation of the British rail industry has seen benefits occurring to the consumers in lower prices, increased service quality and in some cases choice of operator. The operators have seen a reduction in their potential profits when compared to a counterfactual scenario but profits have always remained consistent. That this is mainly due to the increases in subsidy and support from the Government has shown that the real losers in the initiative have been the Government and therefore the non-users who have contributed through taxes to the increasingly costly service provision.

The overall conclusion is thus that the privatisation package has been welfare negative. The most important cause has been the complexity and fragmented nature of the supply-side arrangements. Further reforms of these arrangements are probably warranted in order to address the cost deficiencies over and above those suggested could be delivered through the McNulty Review (2011). There are, however, other narratives that can be offered to support the findings. Supporters of the policy reforms would point out that privatisation was showing

some modest welfare gains up to 2000 or was, at worst, welfare neutral. The Hatfield crash changed that, and although the causes of the accident could be related to the changes in infrastructure maintenance procedures instigated by privatisation, the response was to take both infrastructure and train operations more firmly under public control (Glaister, 2004). This viewpoint would see the welfare losses from 2000 onwards as reflecting the failure of Governmental intervention, not privatisation (Hood, 1994). The counter argument is that any welfare gains achieved up to 2000 were as a result of both Train Operating Companies and Railtrack adopting business practices that were unsustainable – the subsequent business failures were a direct consequence of the privatisation initiative (Wolmar, 2005).

This thesis has contributed to the current research by providing a plausible account of the impact of privatisation on the rail industry. The time scales covered and the breadth of topics included has led to a conclusive argument for the privatisation initiative costing far in excess of the benefits that have been felt. Further and additional work has been identified as possible routes to achieving a greater understanding of the impacts of which developing additional methodologies for ascertaining a counterfactual is one. Although the cost of privatising may be controversial there are few who believe the benefits to consumers would have arisen under the counterfactual. There may have been considerable cost savings but these were unlikely to have been transferred into consumer benefits. From this stance alone it can be seen that privatisation has had a positive impact, albeit a costly one.

# Appendix 1 Franchised Passenger Services 1996-97

| BR Train Operating Unit | Effective From | Franchisee |
|---|---|---|
| South West Trains | 4 Feb 1996 | Stagecoach Holdings |
| Great Western | 4 Feb 1996 | Great Western Holdings (MBO/First Bus/3i) |
| East Coast | 28 Apr 1996 | Great North Eastern Railway (Sea Containers) |
| Gatwick Express | 28 Apr 1996 | National Express Group |
| Midland Mainline | 28 Apr 1996 | National Express Group |
| South Central | 26 May 1996 | Connex Rail (CGEA) |
| LTS Rail | 26 May 1996 | Prism Rail |
| Chiltern Railways | 21 July 1996 | M40 Trains (MBO/Laing) |
| South Eastern | 13 Oct 1996 | Connex Rail (CGEA) |
| South Wales & West | 13 Oct 1996 | Prism Rail |
| Cardiff Railway | 13 Oct 1996 | Prism Rail |
| Thames Trains | 13 Oct 1996 | Victory Railway Holdings (MBO/Go-Ahead Group) |
| Island Line | 13 Oct 1996 | Stagecoach |
| Anglia Railways | 5 Jan 1997 | GB Railways |
| CrossCountry | 5 Jan 1997 | Virgin Railways |
| Great Eastern | 5 Jan 1997 | First Bus |
| West Anglia Great Northern | 5 Jan 1997 | Prism Rail |
| Merseyrail Electrics | 19 Jan 1997 | MTL Trust Holdings |
| North West | 2 Mar 1997 | GW Holdings |
| North London | 2 Mar 1997 | National Express Group |
| North East | 2 Mar 1997 | MTL Trust Holdings |
| Thameslink | 2 Mar 1997 | GOVIA (Go-Ahead/VIA GTI) |
| Central | 2 Mar 1997 | National Express Group |
| West Coast | 9 Mar 1997 | Virgin Railways |
| ScotRail | 31 Mar 1997 | National Express Group |

# Appendix 2 Moving Average Calculations

| | | PKm | | | |
|---|---|---|---|---|---|
| | x | y | XY | $X_2$ | $Y_2$ |
| 1982-83 | 1 | 29.39 | 29.39 | 1 | 863.7721 |
| 1983-84 | 2 | 29.24 | 58.48 | 4 | 854.9776 |
| 1984-85 | 3 | 29.29 | 87.87 | 9 | 857.9041 |
| 1985-86 | 4 | 29.92 | 119.68 | 16 | 895.2064 |
| 1986-87 | 5 | 30.92 | 154.6 | 25 | 956.0464 |
| 1987-88 | 6 | 31.75 | 190.5 | 36 | 1008.063 |
| 1988-89 | 7 | 32.45 | 227.15 | 49 | 1053.003 |
| 1989-90 | 8 | 32.97 | 263.76 | 64 | 1087.021 |
| 1990-91 | 9 | 33.07 | 297.63 | 81 | 1093.625 |
| 1991-92 | 10 | 32.61 | 326.1 | 100 | 1063.412 |
| 1992-93 | 11 | 31.76 | 349.36 | 121 | 1008.698 |
| 1993-94 | 12 | 30.98 | 371.76 | 144 | 959.7604 |
| | **78** | **374.35** | **2476.28** | **650** | **11701.49** |
| 1994-95 | 13 | 31.28073 | 406.6495 | 169 | 978.4843 |
| | **91** | **405.6307** | **2882.93** | **819** | **12679.97** |
| 1995-96 | 14 | 31.51982 | 441.2775 | 196 | 993.4993 |
| | **105** | **437.1506** | **3324.207** | **1015** | **13673.47** |
| 1996-97 | 15 | 31.72017 | 475.8025 | 225 | 1006.169 |
| | **120** | **468.8707** | **3800.01** | **1240** | **14679.64** |
| 1997-98 | 16 | 31.89532 | 510.3252 | 256 | 1017.312 |
| | **136** | **500.766** | **4310.335** | **1496** | **15696.95** |
| 1998-99 | 17 | 32.05363 | 544.9117 | 289 | 1027.435 |
| | **153** | **532.8197** | **4855.246** | **1785** | **16724.39** |
| 1999-00 | 18 | 32.20037 | 579.6066 | 324 | 1036.864 |
| | **171** | **565.02** | **5434.853** | **2109** | **17761.25** |
| 2000-01 | 19 | 32.33899 | 614.4408 | 361 | 1045.81 |
| | **190** | **597.359** | **6049.294** | **2470** | **18807.06** |
| 2001-02 | 20 | 32.4718 | 649.436 | 400 | 1054.418 |
| | **210** | **629.8308** | **6698.73** | **2870** | **19861.48** |
| 2002-03 | 21 | 32.60038 | 684.608 | 441 | 1062.785 |
| | **231** | **662.4312** | **7383.338** | **3311** | **20924.26** |
| 2003-04 | 22 | 32.72583 | 719.9682 | 484 | 1070.98 |
| | **253** | **695.157** | **8103.306** | **3795** | **21995.24** |
| 2004-05 | 23 | 32.84892 | 755.5252 | 529 | 1079.052 |
| | **276** | **728.006** | **8858.831** | **4324** | **23074.3** |
| 2005-06 | 24 | 32.97023 | 791.2855 | 576 | 1087.036 |
| | **300** | **760.9762** | **9650.117** | **4900** | **24161.33** |
| 2006-07 | 25 | 33.09015 | 827.2538 | 625 | 1094.958 |
| | **325** | **794.0663** | **10477.37** | **5525** | **25256.29** |
| 2007-08 | 26 | 33.20901 | 863.4341 | 676 | 1102.838 |
| | **351** | **827.2754** | **11340.8** | **6201** | **26359.13** |
| 2008-09 | 27 | 33.32701 | 899.8294 | 729 | 1110.69 |
| | **378** | **860.6024** | **12240.63** | **6930** | **27469.82** |

**RevPKm**

| | x | y | XY | $X_2$ | $Y_2$ |
|---|---|---|---|---|---|
| 1982-83 | 1 | 0.097948 | 0.097948 | 1 | 0.009594 |
| 1982-83 | 2 | 0.09753 | 0.19506 | 4 | 0.009512 |
| 1983-84 | 3 | 0.09764 | 0.292919 | 9 | 0.009533 |
| 1984-85 | 4 | 0.099444 | 0.397776 | 16 | 0.009889 |
| 1985-86 | 5 | 0.101625 | 0.508127 | 25 | 0.010328 |
| 1986-87 | 6 | 0.103219 | 0.619316 | 36 | 0.010654 |
| 1987-88 | 7 | 0.104668 | 0.732675 | 49 | 0.010955 |
| 1988-89 | 8 | 0.105414 | 0.843315 | 64 | 0.011112 |
| 1989-90 | 9 | 0.105566 | 0.950092 | 81 | 0.011144 |
| 1990-91 | 10 | 0.106006 | 1.060059 | 100 | 0.011237 |
| 1991-92 | 11 | 0.107094 | 1.178036 | 121 | 0.011469 |
| 1992-93 | 12 | 0.1086 | 1.303198 | 144 | 0.011794 |
| 1993-94 | **78** | **1.234754** | **8.178522** | **650** | **0.127223** |
| | 13 | 0.109667 | 1.425673 | 169 | 0.012027 |
| 1994-95 | **91** | **1.344422** | **9.604195** | **819** | **0.139249** |
| | 14 | 0.110729 | 1.550204 | 196 | 0.012261 |
| 1995-96 | **105** | **1.455151** | **11.1544** | **1015** | **0.15151** |
| | 15 | 0.111787 | 1.676808 | 225 | 0.012496 |
| 1996-97 | **120** | **1.566938** | **12.83121** | **1240** | **0.164007** |
| | 16 | 0.112843 | 1.805493 | 256 | 0.012734 |
| 1997-98 | **136** | **1.679781** | **14.6367** | **1496** | **0.17674** |
| | 17 | 0.113898 | 1.936264 | 289 | 0.012973 |
| 1998-99 | **153** | **1.793679** | **16.57296** | **1785** | **0.189713** |
| | 18 | 0.114951 | 2.069127 | 324 | 0.013214 |
| 1999-00 | **171** | **1.90863** | **18.64209** | **2109** | **0.202927** |
| | 19 | 0.116004 | 2.204082 | 361 | 0.013457 |
| 2000-01 | **190** | **2.024635** | **20.84617** | **2470** | **0.216384** |
| | 20 | 0.117057 | 2.341133 | 400 | 0.013702 |
| 2001-02 | **210** | **2.141691** | **23.18731** | **2870** | **0.230086** |
| | 21 | 0.118109 | 2.48028 | 441 | 0.01395 |
| 2002-03 | **231** | **2.2598** | **25.66759** | **3311** | **0.244036** |
| | 22 | 0.11916 | 2.621526 | 484 | 0.014199 |
| 2003-04 | **253** | **2.37896** | **28.28911** | **3795** | **0.258235** |
| | 23 | 0.120212 | 2.76487 | 529 | 0.014451 |
| 2004-05 | **276** | **2.499172** | **31.05398** | **4324** | **0.272686** |
| | 24 | 0.121263 | 2.910313 | 576 | 0.014705 |
| 2005-06 | **300** | **2.620435** | **33.96429** | **4900** | **0.287391** |
| | 25 | 0.122314 | 3.057855 | 625 | 0.014961 |
| 2006-07 | **325** | **2.742749** | **37.02215** | **5525** | **0.302351** |
| | 26 | 0.123365 | 3.207498 | 676 | 0.015219 |
| 2007-08 | **351** | **2.866114** | **40.22965** | **6201** | **0.31757** |
| | 27 | 0.124416 | 3.35924 | 729 | 0.015479 |
| 2008-09 | **378** | **2.990531** | **43.58889** | **6930** | **0.33305** |

**TKm**

| | x | y | XY | $X_2$ | $Y_2$ |
|---|---|---|---|---|---|
| 1982-83 | 1 | 311.78 | 311.78 | 1 | 97206.77 |
| 1982-83 | 2 | 309.63 | 619.26 | 4 | 95870.74 |
| 1983-84 | 3 | 307.02 | 921.06 | 9 | 94261.28 |
| 1984-85 | 4 | 309.8 | 1239.2 | 16 | 95976.04 |
| 1985-86 | 5 | 316.51 | 1582.55 | 25 | 100178.6 |
| 1986-87 | 6 | 322.8 | 1936.8 | 36 | 104199.8 |
| 1987-88 | 7 | 330.44 | 2313.08 | 49 | 109190.6 |
| 1988-89 | 8 | 338.84 | 2710.72 | 64 | 114812.5 |
| 1989-90 | 9 | 345.42 | 3108.78 | 81 | 119315 |
| 1990-91 | 10 | 348.88 | 3488.8 | 100 | 121717.3 |
| 1991-92 | 11 | 349.66 | 3846.26 | 121 | 122262.1 |
| 1992-93 | 12 | 349.35 | 4192.2 | 144 | 122045.4 |
| 1993-94 | **78** | **3940.13** | **26270.49** | **650** | **1297036** |
| | 13 | 353.9629 | 4601.518 | 169 | 125289.7 |
| 1994-95 | **91** | **4294.093** | **30872.01** | **819** | **1422326** |
| | 14 | 358.4319 | 5018.047 | 196 | 128473.4 |
| 1995-96 | **105** | **4652.525** | **35890.05** | **1015** | **1550799** |
| | 15 | 362.8104 | 5442.157 | 225 | 131631.4 |
| 1996-97 | **120** | **5015.335** | **41332.21** | **1240** | **1682431** |
| | 16 | 367.1302 | 5874.083 | 256 | 134784.6 |
| 1997-98 | **136** | **5382.465** | **47206.29** | **1496** | **1817215** |
| | 17 | 371.4106 | 6313.98 | 289 | 137945.8 |
| 1998-99 | **153** | **5753.876** | **53520.27** | **1785** | **1955161** |
| | 18 | 375.664 | 6761.952 | 324 | 141123.4 |
| 1999-00 | **171** | **6129.54** | **60282.23** | **2109** | **2096285** |
| | 19 | 379.8985 | 7218.071 | 361 | 144322.8 |
| 2000-01 | **190** | **6509.438** | **67500.3** | **2470** | **2240607** |
| | 20 | 384.1194 | 7682.387 | 400 | 147547.7 |
| 2001-02 | **210** | **6893.558** | **75182.68** | **2870** | **2388155** |
| | 21 | 388.3304 | 8154.938 | 441 | 150800.5 |
| 2002-03 | **231** | **7281.888** | **83337.62** | **3311** | **2538956** |
| | 22 | 392.5341 | 8635.75 | 484 | 154083 |
| 2003-04 | **253** | **7674.422** | **91973.37** | **3795** | **2693039** |
| | 23 | 396.7323 | 9124.843 | 529 | 157396.5 |
| 2004-05 | **276** | **8071.155** | **101098.2** | **4324** | **2850435** |
| | 24 | 400.9263 | 9622.232 | 576 | 160741.9 |
| 2005-06 | **300** | **8472.081** | **110720.4** | **4900** | **3011177** |
| | 25 | 405.1171 | 10127.93 | 625 | 164119.9 |
| 2006-07 | **325** | **8877.198** | **120848.4** | **5525** | **3175297** |
| | 26 | 409.3054 | 10641.94 | 676 | 167530.9 |
| 2007-08 | **351** | **9286.503** | **131490.3** | **6201** | **3342828** |
| | 27 | 413.4918 | 11164.28 | 729 | 170975.4 |
| 2008-09 | **378** | **9699.995** | **142654.6** | **6930** | **3513803** |

## References

1992. New Opportunities for the Railways: The Privatiation of British Rail. *Cm 2012.* Great Britain: HMSO.

ALCHIAN, A. A. & DEMSETZ, H. 1973. The Property Right Paradigm. *The Journal of Economic History,* 33**,** 16-27.

ALEXANDERSSON, G., NASH, C. A. & PRESTON, J. M. 2008. Risk and Reward in Rail Contracting. *Research in Transportation Economics,* 22**,** 31-35.

ANNEMA, J. A., KOOPMANS, C. & VAN WEE, B. 2007. Evaluating transport infrastructure investments: The Dutch experience with a standardized approach. *Transport Reviews,* 27**,** 125-150.

ATOC. 2005. *RE: Rail Passenger Numbers Rise To Near-record Levels.* Type to RELEASE, P.

ATOC 2007. Shocking experience for 192 whose fare-dodging efforts didn't stand a ghost of a chance. Press Release.

ATOC 2009. Connecting Communities: Expanding Access to the Rail Network, . *In:* ASSOCIATION OF TRAIN OPERATING COMPANIES (ed.).

BALCOMBE, R., MACKETT, R., PAULLEY, N., PRESTON, J. M., SHIRES, J., TOTHERIDGE, H., WARDMAN, M. & WHITE, P. 2004. The Demand for Public Transport: a practical guide. *In:* TRL (ed.).

BALCOMBE, R., PAULLEY, N., PRESTON, J. M., MACKETT, R., TITHERIDGE, H., WARDMAN, M., SHIRES, J. & WHITE, P. 2006. The demand for public transport: The effects of fares, quality of service, income and car ownership *Transport Policy,* 13**,** 295-306.

BOARDMAN, A. E., LAURIN, C., MOORE, M. A. & VINING, A. R. 2009. A Cost-Benefit Analysis of the Privatization of Canadian National Railway. *Canadian Public Policy-Analyse De Politiques,* 35**,** 59-83.

BOS, E. J. & VLEUGEL, J. M. 2005. Incorporating nature valuation in cost-benefit analysis. *Ecosystems and Sustainable Development V,* 81**,** 281-290
755.

BOYCKO, M., SHLEIFER, A. & VISHNY, R. 1996a. A Theory of Privatisation. *The Economic Journal,* 106**,** 309-319.

BOYCKO, M., SHLEIFER, A. & VISHNY, R. 1996b. A Theory of Privatisation. *The Economic Journal,* 106**,** 309-319.

BRADSHAW, W. P. 1995. Why British rail is being privatised.

BRAUN, D. & GUSTON, D. H. 2003. Principal–agent theory and research policy: an introduction. *Science and Public Policy,* 30**,** 302-308.

BRB 1994. Annual Report and Accounts. London: British Railways Board.

BURTON, G., CARROL, G. & WALL, S. 2002. *Quantitative Methods for Business and Economics,* Harlow, Pearson Education Ltd.

BURTON, J. 1987. Privatization: The thatcher case. *Managerial and Decision Economics,* 8**,** 21-29.

BUTLER, E. 1985. The Omega Report. Adam Smith Institute.

CALVO, F. & DE OÑA, J. 2012. Are rail charges connected to costs? *Journal of Transport Geography,* 22**,** 28-33.

CAMILLERI, M. 2004. *Forecasting using Non Linear Techniques in Time Series Analysis* [Online]. Valletta: University of Malta. Available: www.cs.um.edu.mt/~csaw/CSAW04/.../michel_camilleri.ppt [Accessed].

CANNON, D. F., EDEL, K. O., GRASSIE, S. L. & SAWLEY, K. 2003. Rail defects: an overview. *Fatigue & Fracture of Engineering Materials & Structures,* 26**,** 865-886.

CAVES, D. W. & CHRISTENSEN, L. R. 1980. The Relative Efficiency of Public and Private Firms in a Competitive Environment: The Case of Canadian Railroads. *Journal of Political Economy,* 88**,** 958-976.

CHEVROULET, T., GIORGI, L. & REYNAUD, C. 2011. A New Paradigm for the Assessment of High Speed Rail Projects and How to Contain Cost Overruns: Lessons from the EVA-TREN Project. *Social Science Research Network,* April 3rd.

CLEMENT, D. 2006. GNER sues regulator over east coast rivals. *The Independent*, 12th July 2006.

COLLOPY, F. 1992. Expert Opinions About Extrapolation And The Mystery Of The Overlooked Discontinuities. *International Journal of Forecasting,* 8**,** 575-582.

COMMISSION, C. 2007. Summary of Hearing with National Express. London: Competition Commission.

COMMITTEE, H. O. C. S. 1983. Serpell Committee Report on the Review of Railway Finances: Second Report from the Transport Committee. *In:* COMMITTEE, T. S. (ed.). HMSO.

COWIE, J. 2001. Subsidy and Productivity in the Privatised British Passenger Railway. *International Conference on Competition and Ownership in Land Passenger Transport.* Molde: Thredbo 7.

COWIE, J. 2009. The British Passenger Rail Privatisation Conclusions on Subsidy and Efficiency from the First Round of Franchises. *Journal of Transport Economics and Policy,* 43**,** 85-104.

COWIE, J. 2010a. Productivity and performance in the British rail freight industry since privatisation. *World Association of Transportation Research (WCTR).* Lisbon.

COWIE, J. 2010b. X-Inefficiency in British railway engineering. *World Association of Transportation Research (WCTR).* Lisbon.

CROMPTON, G. & JUPE, R. 2003. "SUCH A SILLY SCHEME": THE PRIVATISATION OF BRITAIN'S RAILWAYS 1992-2002. *Critical Perspectives on Accounting,* 14**,** 617-645.

CROSSRAIL 2007. Crossrail Environmental Statement. London: Crossrail Ltd.

DFT 1992. New Opportunities for the Railways: The Privatisation of British Rail;. *In:* TRANSPORT, D. F. (ed.). HMSO.

DFT 1998. A New Deal for Transport: Better for Everyone. *In:* TRANSPORT, D. F. (ed.). Hansard.

DFT 2000. Transport Ten Year Plan 2000. *In:* TRANSPORT, D. F. (ed.). Hansard.

DFT 2006. DfT Technical note - PSA target 2 *In:* TRANSPORT, D. F. (ed.). Hansard.

DFT 2007a. Briefing note on the development of the HLOS: Joint working and modelling. *In:* TRANSPORT, D. F. (ed.). Hansard.

DFT 2007b. Comprehensive Spending Review 2007: Value for Money delivery agreement. *In:* TRANSPORT, D. F. (ed.). TSO.

DFT 2008. Department for Transport Annual Report 2008. *In:* TRANSPORT, D. F. (ed.). TSO.

DFT 2009a. Franchise payment profiles. *In:* TRANSPORT, D. F. (ed.). TSO.

DFT 2009b. National Travel Survey 2008. *In:* 2.9, T. (ed.). London: Hansard.

DFT 2009c. Transport Statistics Great Britain. *In:* TRANSPORT, D. F. (ed.) 35 ed.: TSO.

DNES, A. W. 1992. *Franchising passenger rail services*, University of St. Andrews, Department of Economics.

DNES, A. W. 1993. *On the wrong tracks : the Government's proposal for franchising passenger rail*, David Hume Institute.

DOBEK, M. 1993. Privatisation as a Political Priority. *Political Studies,* XLI**,** 24-40.

DOCHERTY, I. & SHAW, J. 2003. *A New Deal for Transport: the UK's struggle with the sustainable transport agenda* Chichester, Wiley & Sons.

DODGSON, J. & TOPHAM, N. 1987. Shadow Price of Public Funds: A Survey. *In:* GLAISTER, S. (ed.) *Transport Subsidy* Newbury.

DREW, J. 2009. The Benefits for Rail Freight Customers of Vertical Seperation and Open Access. *Transport Reviews,* 29.

ELSE, P. A. J., T. 1994. Will the fare be fair? An examination of the pricing effects of the privatization of rail services. *International Review of Applied Economics,* 8**,** 291-302.

ENGLE, M. 2011. *Eleven Minutes Late: A Train Journey to the Soul of Britain,* London, Pan Macmillan.

ENGLES, M. 2009. *Eleven Minutes Late: A Train Journey to the Soul of Britain,* London, Macmillan.

EVANS, A. W. 2007. Rail safety and rail privatisation in Britain. *Accident Analysis and Prevention,* 39**,** 510-523.

FEDERICI, M., ULGIATI, S. & BASOSI, R. 2009. Air versus terrestrial transport modalities: An energy and environmental comparison. *Energy,* 34**,** 1493-1503.

FEIGENBAUM, H. & HENIG, J. 1994. The Political Underpinnings of Privatization: A Typology. *World Politics,* 46**,** 185-208.

FENG, C. M. & WANG, S. M. 2005. The fully economic evaluation for transport infrastructure project. *Proceedings of the Eastern Asia Society for Transportation Studies, Vol 5,* 5**,** 1778-1791

FIELD, A. 2005. *Discovering Statistics Using SPSS,* London, Sage Publications.

FLYVBJERG, B. 2007a. Cost Overruns and Demand Shortfalls in Urban Rail and Other Infrastructure. *Transportation Planning and Technology,* 30**,** 9-30.

FLYVBJERG, B. 2007b. Policy and planning for large-infrastructure projects: problems, causes, cures. *Environment and Planning B: Planning and Design,* 34**,** 578 - 597.

FOSTER, C. 1994. The Economics of Rail Privatisation Centre for the Study of Regulated Industries. *CIPFA.* London.

FRAJA, G. D. 1991. Efficiency and Privatisation in Imperfectly Competitive Industries. *The Journal of Industrial Economics,* 39**,** 311-321.

GAMBLE, A. 1989. Privatisation, Thatcherism, and the British State. *Journal of Law and Society,* 16**,** 1-20.

GARDNER, E. S., JR. & MCKENZIE, E. 1985. Forecasting Trends in Time Series. *Management Science,* 31**,** 1237-1246.

GIBSON, S. 2005. Incentivising operational performance on the UK rail infrastructure since 1996.

GLAISTER, S. 2002. UK Transport Policy 1997-2001. *Oxford Review of Economic Policy,* 18**,** 154-186.

GLAISTER, S. 2004. British Rail Privatisation - Competition Destroyed by Politics. *Competencia en el Transporte Ferroviario.* Madrid: Fundación Rafael del Pino.

GLAISTER, S., BURNHAM, J., STEVENS, H. & TRAVERS, T. 2006. *Transport Policy in Britain,* Basingstoke, Palgrave Macmillan.

GODWARD, E. 1998. The privatization of British Rail 1994-1997. *Proc Instn Mech Engrs* Vol 212**,** pp 191-200.

GONZÁLEZ-PÁRAMO, J. M. & DE COS, P. H. 2005. The Impact of Public Ownership and Competition on Productivity. *Kyklos,* 58**,** 495-517.

GONZALEZ-SAVIGNAT, M. 2004. Competition in air transport - The case of the high speed train. *Journal of Transport Economics and Policy,* 38**,** 77-107.

GOODWIN, P. 1999. Transformation of transport policy in Great Britain. *Transportation Research Part A: Policy and Practice,* 33**,** 655-669.

GOURVISH, T. 2002a. *British Rail 1974-97: From Integration to Privatisation,* Oxford, Oxford University Press.

GOURVISH, T. 2002b. The Privatisation Debate and Organising for Quality. *British Rail 1974-1997.*

GOURVISH, T. 2008. *Britain's Railways 1997-2005 Labour's Strategic Experiment,,* Oxford, Oxford University Press.

GOVERNMENT 2000. Transport Act 2000. *c.38.* UK.

GRITTEN, A. 1988. Reviving the Railways: A Victorian Future? London: London Centre for Policy Issues.

GWILLIAM, K. 2008. Bus transport: Is there a regulatory cycle? *Transportation Research Part A: Policy and Practice,* 42**,** 1183-1194.

HARRIS, N. & GODWARD, E. 1997. *The Privatisation of British Rail,* London, Railway Consultancy Press.

HARVEY, A. C. 2006. Forecasting with Unobserved Components Time Series Models. *In:* ELLIOT, G., GRANGER, C. & TIMMERMANN, A. (eds.) *Handbook of Economic Forecasting.* North Holland.

HAUBRICH, D. 2001. UK rail privatisation five years down the line: an evaluation of nine policy objectives. *Policy and Politics,* 29**,** 317-336.

HEADICAR, P. 2003. Land Use Planning and the Management of Transport Demand. *In:* PRESTON, J. M. & HINE, J. (eds.) *Integrated futures and transport choices: UK transport policy beyond the 1998 white paper and transport acts.* Aldershot: Ashgate.

HELM, D. 2000. A Critique of Rail Regulation. *Beesley Lecture.* New College, Oxford.

HÉRITIER, A. 2002. Public-interest services revisited. *Journal of European Public Policy,* 9**,** 995-1019.

HIBBS, J., KNIPPING, O., MERERT, R., NASH, C., ROY, R., TYRRALL, D. E. & DWELLINGS, R. 2006. The Railways, the Market and the Government. London: The Institute of Economic Affairs.

HISCOCK, R., MACINTYRE, S., KEARNS, A. & ELLAWAY, A. 2002. Means of transport and ontological security: Do cars provide psycho-social benefits to their users? *Transportation Research Part D: Transport and Environment,* 7**,** 119-135.

HOOD, C. 1994. *Explaining Economic Policy Reversals,* Buckingham, Open University Press.

IRVINE, K. 1987. *The Right Lines,* London, ASI.

IRVINE, K. 1988. *Track to the Future,* London, ASI.

IRVING, K. 1987. The Right Lines. The Adam Smith Institute.

IVALDI, M. A. M., G. 2008. Subadditivity Test for Network Separation with an Application to US Railroads. *Review of Network Economics,* 7**,** 159-171.

JEFFCOTT, S., PIDGEON, N., WEYMAN, A. & WALLS, J. 2006. Risk, Trust, and Safety Culture in U.K. Train Operating Companies. *Risk Analysis,* 26**,** 1105-1121.

JONES, P., TANDON, P. & VOGELSANG, I. 1990. *Selling public enterprises: a cost-benefit methodology,* London, MIT Press.

JORDANA, J. & LEVI-FAUR, D. 2004. The Politics of Regulation in the Age of Governance. *In:* JORDANA, J. & LEVI-FAUR, D. (eds.) *The Politics of Regulation: Institutions and*

*Regulatory Reforms for the Age of Governance.* Cheltenham: Edward Elgar Publishing Ltd.

JUPE, R. 2005. The Future of Rail? An Evaluation of the 2004 Railway Industry White Paper. *Public Money and Management,* 25**,** 187-194.

JUPE, R. & CROMPTON, G. 2006. "A deficient performance": The regulation of the train operating companies in Britain's privatised railway system. *Critical Perspectives on Accounting,* 17**,** 1035-1065.

KASSAM, I. 2006. Train targets: how late is 'late'? *Interactive Investor,* February.

KAY, J. A. 1987. The State and the Market: The UK Experience of Privatisation. *Group of 30.* Paris.

KAY, J. A. 2000. Experiences from the United Kingdom in the regulation of privatised utilities. *Statistical and Social Inquiry Society of Ireland,* 29.

KENNEDY, J. & SMITH, A. 2004. Assessing the efficient cost of sustaining Britain's rail network: Perspectives based on zonal comparisons. *Journal of Transport Economics and Policy,* 38**,** 157-190.

KENNEDY, P. 2008. *A Guide to Econometrics,* Oxford, Blackwell Publishing.

KENNY, T. & GRAY, N. F. 2009. Comparative performance of six carbon footprint models for use in Ireland. *Environmental Impact Assessment Review,* 29**,** 1-6.

KIDOKORO, Y. 2004. Cost-benefit analysis for transport networks - Theory and application. *Journal of Transport Economics and Policy,* 38**,** 275-307.

KNOWLES, R. D. 2004. Impacts of privatising Britain's rail passenger services - franchising, refranchising, and ten year transport plan targets. *Environment and Planning A,* 36**,** 2065-2087.

KOPPENJAN, J. & LEIJTEN, M. 2007. How to Sell a Railway: Lessons on the privatisation of Three Dutch Railway Projects.

LELEUR, S. 2001. Transport Infrastructure Planning: modelling of socio-economic feasibility risks. *EUROSIM 2001, Shaping Future with Simulation.* Delft.

LETZA, S. R., SMALLMAN, C. & SUN, X. P. 2004. Reframing privatisation: Deconstructing the myth of efficiency. *Policy Sciences,* 37**,** 159-183.

LIBECAP, G. 1989. *Contracting for Property Rights,* Cambridge, Cambridge University Press.

LOVEGROVE, K. 2004. *Railway: identity, design and culture* London, Laurence King.

LOVELL, K., BOUCH, C., SMITH, A., NASH, C., ROBERTS, C., WHEAT, P., GRIFFITHS, C. & SMITH, R. 2011. Introducing New Technology to the Railway Industry: System-Wide Incentives and Impacts. *Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit,* 225**,** 192-201.

MACKIE, P. J. & PRESTON, J. M. 1998. Twenty-one sources of error and bias in transport project appraisal. *Transport Policy,* 5**,** 1-7.

MACKINNON, D. 2008. Rescaling employment relations: key outcomes of change in the privatised rail industry. *Environment and Planning A,* 40**,** 1347-1369.

MAIO, G., OLSON, J., BERNARD, M. & LUKE, M. 2006. Ideologies, Values, Attitudes, and Behavior
Handbook of Social Psychology. *In:* DELAMATER, J. (ed.). Springer US.

MAJONE, G. 1997. From the Positive to the Regulatory State: Causes and Consequences of Changes in the Mode of Governance. *Journal of Public Policy,* 17**,** 139-167.

MARQUES, R. C. 2008. Comparing private and public performance of Portuguese water services. *Water Policy,* 10**,** 25-42.

MARSH, D. 1991. PRIVATIZATION UNDER MRS. THATCHER: A REVIEW OF THE LITERATURE. *Public Administration,* 69**,** 459-480.

MCNULTY, R. 2011. Realising the Potential of GB Rail: Final Independent Report of the Rail Value for Money Study. *In:* TRANSPORT, D. F. (ed.). London: Hansard.

MCVEA, H. 2005. Financial Services Regulation Under The Financial Services Authority: A Reassertion Of The Market Failure Thesis? *The Cambridge Law Journal,* 64 413-448.

MERKERT, R. 2010. Changes in transaction costs over time – The case of franchised train operating firms in Britain. *Research in Transportation Economics,* 29**,** 52-59.

MIZUTANI, F. A. U., S. 2011. *Does Vertical Separation Reduce Cost? An Empirical Analysis of the Rail Industry in OECD Countries*. *Graduate School of Business Administration Kobe University,* 28.

MORRIS, N. & O'GRADY, S. 2009. 'This is the worst recession for over 100 years'. *The Independant*, Tuesday 10th February.

NASH, C. 2002. Regulatory Reform in Rail Transport - the UK Experience. *Swedish Economic Policy Review,* 9**,** 257-286.

NASH, C. & PRESTON, J. 1994. Railway performance - how does Britain compare? *Public Money & Management,* 14**,** 47 - 53.

NASH, C. & SMITH, A. 2007. Passenger rail franchising: British experience.

NEWBERY, D. M. G. 2002. *Privatization, restructuring, and regulation of network utilities* London, MIT Press.

O'LOUGHLIN, E. 2005. What rail privatisation in Britain has meant: public specification and private delivery.

OPPER, S. 2004. The Political Economy of Privatization: Empirical Evidence from Transition Economies. *Kyklos,* 57**,** 559-586.

ORR 2003. Access Charges Review 2003: Final Conclusions. London.

ORR 2008a. National Rail Trends. Hansard.

ORR 2008b. A report on the programme of international visits carried out by ORR between July - October 2007. *ORR Best Practice Study - Summary Report.* ORR.

ORR 2009a. Determination of Network Rail's outputs and funding for 2009-14. *In:* REGULATOR, O. O. T. R. (ed.). Hansard.

ORR 2009b. National Rail Trends 2009. *National Rail Trends.* London: Office of Rail Regulator.

ORR. 2009c. *Publications and Statistics* [Online]. London: http://www.rail-reg.gov.uk/server/show/nav.2026. [Accessed].

ORR 2011. *Realising the Potential of GB Rail,* Final Independent Report of the Rail Value for Money Study. London: DfT and ORR.

PARKIN, M. & KING, D. 1992. *Economics,* Wokingham, Addison-Wesley Publishing.

PAWSON, R. 2002. Evidence-based Policy: The Promise of 'Realist Synthesis'. *Evaluation,* 8**,** 340-358

PEARCE, D. W., ATKINSON, G., MOURATO, S. & ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT. 2006. *Cost-benefit analysis and the environment : recent developments,* Paris, Organisation for Economic Co-operation and Development.

PICARD, N., ANTONIOU, C. & DE PALMA, A. 2010. Working paper 2.4: Econometric Models. *Sustain City.* EU.

POLLITT, M. 1995. *Ownership and Performance in Electric Utilities: The International Evidence on Privatisation and Efficiency,* New York, Oxford University Press.

POLLITT, M. G. & SMITH, A. S. J. 2002. The restructuring and privatisation of British rail: Was it really that bad? *Fiscal Studies,* 23**,** 463-502.

POTTER, S. 2010. Transport Integration - an impossible dream? *Universities Transport Studies Group Annual Concerence.* University of Plymouth.

PRESTON, J. 1999a. Competition in British Railways – What Have We Learned? *Danish Transport Conference. .* Aalborg,.

PRESTON, J. 2000. *The franchising and re-franchising of passenger rail services in Britain*, University of Oxford, Transport Studies Unit.

PRESTON, J. 2007. The good, the bad and the ugly: a review of rail franchising in Britain.

PRESTON, J., WARDMAN, M. & WHELAN, G. 1999. An Analysis for the Potential for On-Track Competition in the British Passenger Rail Industry. *Journal of Transport Economics and Policy,* 33**,** 77-94.

PRESTON, J., WHELAN, G., NASH, C. & WARDMAN, M. 2000. The Franchising of Passenger Rail Services in Britain. *International Review of Applied Economics,,* 14.

PRESTON, J. M. 1996. Assessing Public Sector Performance: the Case of Western European Railways. *In:* HENSHER, D., J. KING, AND T. OUM (EDS.) (ed.) *World Transport Research, Proceedings of the 7th World Conference on Transport Research.* Oxford: Pergamon.

PRESTON, J. M. 1999b. An Overview of Public Transport Reforms in Great britain and Forecasts for the Future. *International Journal of Transport Economics,* 28**,** 171-188.

PRESTON, J. M. 2002. The transaction cost economics of railways. *Trasporti Europei,* 7**,** 6-15.

PRESTON, J. M. 2008a. Is Labour Delivering a Sustainable Railway? *In:* DOCHERTY, I. & SHAW, J. (eds.) *Traffic Jam: 10 Years of 'Sustainable Transport in the UK.* Bristol: Policy Press.

PRESTON, J. M. 2008b. A Review of Passenger Rail Franchising in Britain: 1996/7 - 2006/7. *Research in Transportation Economics,* 22**,** 71-77.

PRESTON, J. M. 2010. Competition for Long-Distance passenger Rail Services: the emerging evidence. *The Future for Interurban Passenger transport Brining Citizens Closer.* Organisation for Economic Co-operation and Development, International Transport

PRESTON, J. M. & WHELAN, G. A. 1995. *The franchising of passenger rail services in Britain*, University of Leeds, Institute for Transport Studies.

PRICE, C. 1991. Selling public enterprises: A cost/benefit methodology : Leroy Jones, Pankaj Tandon and Ingo Vogelsang, (The MIT Press, 1990). *International Journal of Industrial Organization,* 9**,** 595-596.

PRICE, J. 1999. The Densest network in the World. *In:* BILDERBERG (ed.) *Railways.* Builderberg.org.

PROSSER, T. 2005. Regulatory Contracts and Stakeholder Regulation. *Annals of Public & Cooperative Economics,* 76**,** 35-57.

REUTERS 2009. UK rail operators could be forced to cut fares. *UPDATE* 2ed.

RILEY, C. 2011. *RE: Interview with Chris Riley.* Type to ROBINS, D.

ROSA, J. A. P., E. 2010. When to Privatize? When to Nationalize? A Competition for Ownership Approach. *Kyklos,* 63**,** 110-132.

SAVAGE, M. 2009. Record rail fare rises 'punishing passengers'. *The Independent*, 1st January 2009.

SCHADE, W. & ROTHENGATTER, W. 2003. Improving assessment of transport policies by dynamic cost-benefit analysis. *Transportation Finance, Economics and Economic Development 2003***,** 107-114.

SHAOUL, J. 2004. Railpolitik: The Financial Realities of Operating Britains National Railways. *In:* TERRY, F. (ed.) *Turning the Corner: A Reader in Contemporary Transport Policy.* Chichester: Wiley-Blackwell.

SHAW, J. 2000. *Competition, Regulation and the Privatisation of British Rail,* Aldershot, Ashgate.

SHAW, J. 2001. Competition in the UK passenger railway industry: prospects and problems. *Transport Reviews , ,* Vol. 21,**,** pp 195-216.

SHAW, J., WALTON, W. & FARRINGTON, J. 2003. Assessing the potential for a railway renaissance in Great Britain. *Geoforum,* 34**,** 141-156.

SMITH, A., NASH, C., SANDERS, S. & HOOD, I. Year. How to Get Value for Money Through Private Sector Participation in Rail Service Delivery – International Evidence. *In:* European Transport Conference, 2010 Glasgow.

SMITH, A. & WHEAT, P. 2007. A quantitative study of train operating companies cost and efficiency trends 1996 to 2006: lessons for future franchising policy.

SMITH, A. & WHEAT, P. 2008. International benchmarking of Network Rail's maintenance and renewals costs
ORR.

SMITH, A., WHEAT, P. & SMITH, G. 2009. The role of international benchmarking in developing rail infrastructure efficiency estimates. *Utilities Policy,* In Press, Corrected Proof.

SMITH, A. S. J. 2006. Are Britain's Railways Costing Too Much? Perspectives Based on TFP Comparisons with British Rail 1963–2002. *Journal of Transport Economics and Policy,* 40**,** 1-44.

SMITH, R. A. 2003. The wheel–rail interface—some recent accidents. *Fatigue & Fracture of Engineering Materials & Structures,* 26**,** 901-907.

STARKIE, D. 1984. BR: Privatisation Without Tears. *Economic Affairs,* 5.

STITTLE, J. 2002. Regulatory Control of the Track Access Charges of Railtrack plc. *Public Money and Management,* Jan-Mar**,** 49-54.

THOMPSON, L. S. 2004. Privatizing British Railways. Are There Lessons for the World Bank and its Borrowers? *In:* BOARD, T. S. (ed.) *Transport Papers.* Washington, D.C.: The World Bank.

THOMPSON, S. 2009. Network Rail puts 1,800 maintenance jobs on the line. *Times*, 28/08/09.

TSC 2009a. Inquiry into Priorities for Rail Infrastructure. London: Transport Select Committee.

TSC 2009b. Rail Fares and Franchises. *In:* COMMITTEE, T. S. (ed.). Hansard.

URRY, J., FEATHERSTONE, M. & THRIFT, N. 2005. *Automobilities,* London, Sage

VAN WEE, B. 2007. Rail infrastructure: Challenges for cost-benefit analysis and other ex ante evaluations. *Transportation Planning and Technology,* 30**,** 31-48.

VICKERMAN, R. 1997. High Speed Rail in Europe: Experience and Issues for Future Development. *Annals of Regional Science,* 31**,** 21-38.

VICKERMAN, R. 2007. Cost-benefit analysis and large-scale infrastructure projects: state of the art and challenges. *Environment and Planning B-Planning & Design,* 34**,** 598-610.

VICKERS, J. & YARROW, G. 1989. Privatisation: An Economic Analysis. Cambridge: MIT.

VLEUGEL, J. M. & BOS, E. J. 2008. Ways to deal with the 'temporary' value of cost benefit analysis. *Environmental Economics and Investment Assessment Ii***,** 171-180
316.

WARDMAN, M. 2006. Demand for rail travel and the effects of external factors. *Transportation Research Part E-Logistics and Transportation Review,* 42**,** 129-148.

WARDMAN, M. R. 2005. Demand for rail travel and the effects of external factors,. University of Leeds: Institute for Transport Studies, .

WATSON, R., GILLINGWATER, D. & BOODOO, A. 2004. Using Network Capacity Effectively Where Train Operators Compete for Paths - The UK Experience. *In:* GROUP, T. S. (ed.). Loughborough: Loughborough University.

WHEAT, P. & SMITH, A. 2006. Assessing the marginal infrastructure wear and tear costs for Britain's railway network. *PROCEEDINGS OF THE EUROPEAN TRANSPORT CONFERENCE (ETC)* STRASBOURG, FRANCE. .

WHEAT, P. & SMITH, A. 2008. Assessing the Marginal Infrastructure Maintenance Wear and Tear Costs for Britain's Railway Network. *Journal of Transport Economics and Policy,* 42**,** 189-224.

WHELAN, G. 2008. Econometric Analysis of Long Time series Rail Passenger Demand Aggregates. *Robust Foundations.* DfT.

WHELAN, G., HARVEY, A. & CARTMEL, J. 2010. A Time Series Analysis of Rail Demand in Great Britain. *European Transport Conference.*

WHITE, P. Year. Financial Outcomes of Rail Privatisation in Britain. *In:* RAIL, ed. Proceedings of the European Transport Conference, 1998 Public Transport Regulatory Commission London.

WOLMAR, C. 2005. *On The Wrong Line: How Ideology and Incompetence Wrecked Britain's Railways,* London, Aurum.