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Moving On:

A progressive transport policy for Northern England

Paper 4 from the Northern Economic Agenda project

By Howard Reed

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Institute for Public Policy Research North

Challenging ideas – Changing policy

Contents

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ippr north, the Newcastle-based office of the Institute for Public Policy Research, produces far-reaching policy ideas, stimulating solutions that work nationally as well as locally. These are shaped from our research, which spans the northern economic agenda, public services, Anglo-Scottish relations, food policy and rural issues, as well as a strong democratic engagement strand which involves a wide range of audiences in political debates.

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List of abbreviations

BCR	Benefit-to-cost ratio
CBA	Cost-benefit analysis
CLG	Communities and Local Government
CRDP	City Region Development Plan
CSR	Comprehensive Spending Review
DBERR	Department for Business, Enterprise and Regulatory Reform
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DTI	Department of Trade and Industry
GDP	Gross domestic product
GVA	Gross Value Added
HGV	Heavy goods vehicle
HSR	High-speed rail
HMT	Her Majesty's Treasury
NATA	New Approach To Appraisal
PSA	Public Service Agreement
PTA	Passenger Transport Authority
PTE	Passenger Transport Executive
RDA	Regional Development Agency
RES	Regional Economic Strategy
RSS	Regional Spatial Strategy
RUC	Road user charging
TIF	Transport Innovation Fund

Executive summary

This is the fourth paper produced for ippr's Northern Economic Agenda project, which aims to provide a detailed insight into the performance of England's three Northern regions: the North East, North West and Yorkshire and the Humber. This report looks at the economic, social and environmental aspects of the North's transport system.

We aim to answer a range of crucial questions:

- How can the transport network be improved to better support economic development in the North?
- Can the transport system contribute to faster and more balanced economic growth across the northern regions and city-regions?
- Are the Government's plans for aviation and the road and rail networks in the North compatible with Britain's long-term commitments on climate change?
- What governance arrangements for transport at the national, regional and local level are most conducive to a dynamic, well-functioning, pan-Northern transport system?

A socio-economic framework for assessing transport policy in the North

We argue that there should be three main objectives to transport policy:

1. The transport system should be structured to promote economic prosperity and growth.
2. The transport system should be designed and regulated to minimise adverse effects of transport on the environment and to ensure environmental sustainability in the long run.
3. The transport system should contribute towards reduction in inequalities and social exclusion wherever possible.

In practice these objectives may conflict – which gives rise to policy debates and choices about which to prioritise.

The potential economic benefits and costs from transport fall into four categories:

1. *Public accounts impacts* – costs to central and local government of the transport investment and any ongoing maintenance or operation costs, and grants, subsidies and any additional tax revenues from the transport system.
2. *Economic efficiency impacts* – the user benefits from transport to consumers and businesses, comprising:
   - Changes in travel time
   - Changes in user costs of transport.
3. *Impacts on the reliability of transport services* – increased reliability of transport has an economic benefit due to fewer delays to journeys.
4. *Wider economic impacts* – the most important of these is *agglomeration externalities*, arising because transport can increase the 'effective density' of employment by making it easier for workers to travel to jobs – which can have positive knock-on effects on employment.

As Sir Rod Eddington's review of UK transport policy, which reported in December 2006, suggests, the UK should invest in transport projects with the highest benefit-to-cost ratios. However, the measures of 'benefits' and 'costs' used in the appraisal need to reflect distributional and environmental factors rather than maximising economic growth for its own sake.

Transport provision affects the distribution of economic resources and opportunities, and can impact on social inclusion and exclusion. For example, poorer people find it harder to afford transport and some localities are better served by buses, trains and the road network than others. These distributional impacts should be taken into account when making decisions on transport investments but this cannot be done without making an explicit judgement about the weight

society attaches to distributional considerations. Currently the Department for Transport (DfT)'s appraisal framework attaches insufficient weight to distributional factors. We recommend that DfT gives a more explicit role to distributional considerations in its transport appraisal process.

The environmental impacts of transport are also crucial – in particular, the need to limit greenhouse gas emissions to mitigate climate change needs to be at the centre of a coherent transport policy in the northern context, as elsewhere. Recent Government publications on the future of air travel in the UK recommend substantial expansions of the UK aviation network and have been criticised by environmentalists on the grounds that this growth is inconsistent with long-term targets for cuts in carbon emissions of at least 60 per cent by 2050.

Certainly the UK aviation sector can expand without jeopardising the overall emissions target if other sectors reduce their emissions by more than 60 per cent. But without further reform to mechanisms such as the EU Emissions Trading Scheme and an international agreement to tax aviation fuel (currently exempt from taxation) it is far from clear that air passengers will face the true carbon cost of their journeys in future. Furthermore, the Government provides wildly mixed messages on aviation: while the Department for Environment, Food and Rural Affairs (DEFRA) encourages restraint and offsetting, the Treasury and Departments for Business, Enterprise and Regulatory Reform (BERR) and Transport (DfT) champion the economic contribution of the expanding aviation sector.

Rather than aiming to maximise 'raw' economic growth, transport policy should be targeting a much wider definition of well-being which takes environmental benefits into account. Only if travellers are facing the full social cost of transport emissions are we likely to achieve the essential long-run 'modal shift' to a low-carbon transport system.

Transport provision in the North

Statistics from the Department for Transport show that the profile of the North on most transport statistics is similar to those of the English regions outside London, but very different from London's, where public transport is much more widely used than anywhere else.

The North lags behind in some key dimensions: the northern regions receive less public funding for transport per head than other regions and their roads are in worse overall condition than anywhere else in England. Most importantly, the data reveal that in the North – as with all other English regions outside London – the overwhelming reliance on the car as the main means of transport, fast rates of growth of air travel, high levels of traffic congestion and declining bus use mean that substantial investment in transport infrastructure and reform to transport governance will be required to deliver world-class transport services in the North of the future.

Given the tight funding settlement that transport received in the October 2007 Comprehensive Spending Review (an average increase of 3 per cent per year in nominal terms – which is likely to mean that public spending reduces as a share of GDP over the next few years), it is imperative that the resources that are available for transport investment are allocated to where they can be most effective.

Future transport policy in the North

Upgrading rail links

It is widely recognised that the main rail links between the North and South of England are not likely to be adequate to support sustainable growth over the coming decades. Additionally, the main rail links *within* the North – particularly on the trans-Pennine corridor and between Liverpool and Manchester and Leeds and Sheffield – are not fit for purpose. Failure to invest in these links is likely to lead to increased congestion on rail and road links, decreasing public satisfaction and additional domestic air travel (with serious implications for greenhouse gas emissions).

There are three main alternatives for upgrading rail links between North and South and between city-regions in the North:

1. ***Improving conventional rail links*** – upgrading and expanding existing routes by building extra tracks, improving track quality and signalling, and so on.
2. ***High-speed rail (HSR)*** – constructing one or more high-speed rail lines between London and the North and possibly a high-speed east-west 'box' linking the North West, Yorkshire and the North East using high-speed rail technology at speeds up to 300 kilometres per hour.
3. ***'Maglev'*** – constructing a high-speed transport route using an electromagnetic system with a train running on a 'guideway' without wheels or rails at a maximum speed of 500 km/h.

The choice between these three options comes down to a range of factors:

- ***Cost:*** HSR and Maglev would require substantial upfront investment, whereas upgrades to the conventional network can be scaled according to available investment resources.
- ***Business benefits:*** potentially bigger for HSR and Maglev than for conventional rail, although harder to calculate due to the greater degree of uncertainty over how transport patterns will change.
- ***Environmental impacts:*** impact of HSR and Maglev on the urban and rural landscape would be substantial. However, Maglev has lower carbon emissions per kilometre travelled than rail. HSR has higher emissions than conventional rail per passenger kilometre (but lower than domestic aviation).
- ***Modal shift potential:*** there could be a significant shift from domestic air travel to high-speed surface transport under HSR and Maglev, particularly if combined with rail 'spoke' links to link smaller towns not on the main route.
- ***Safety and reliability:*** for Maglev these are very much still unproven.

We recommend that a detailed appraisal is undertaken of the relative costs and benefits of the three options for rail link upgrades, using an evaluation framework enhanced to take account of environmental and distributional costs and benefits. The DfT's 2007 Rail White Paper suggests that assessment of options for rail upgrades should be delayed until after 2012, but we argue it should begin earlier than this.

Airport expansion

Emissions from aviation currently account for around 5 per cent of total UK carbon emissions, and air passenger traffic is predicted to almost double between now and 2020. Continuing to expand air travel at this rate through to 2050 is incompatible with the Government's target of a 60 per cent cut in carbon emissions by 2050 unless technological advances can enable an unprecedentedly large reduction in greenhouse gas emissions per air passenger.

We recommend that the Government rethinks its long-run airport expansion strategy to make it consistent with the 2050 target in the forthcoming Climate Change Bill. There can be some airport expansion without jeopardising the emissions target, but only a limited amount. Plans for airport expansion in the North need to fit within a pattern that is consistent with meeting the emissions target. This needs to happen alongside measures to make sure that air travellers pay the full social cost of their journeys, through increased taxation of aviation and/or reform to the EU Emissions Trading Scheme.

In addition:

- The links between the rail network and many of the northern airports need to be improved.
- The Government should consider using the planning system to favour expansion of regional airports, including those in the North, to handle a higher proportion of international flights, instead of some of the expansion that is scheduled to take place at the London airports, opening up a wider range of destinations to local access by residents in the North and benefiting the environment by decreasing demand for domestic flights.

Road travel

We argue that there should be two main policy objectives for northern roads and motoring:

1. Decisions to make new infrastructure investments in road transport should be subject to the same appraisal criteria as other modes of transport investment.
2. There is a very strong case for introducing a national road user charging policy. However, given the current level of public hostility to road pricing this will be a major challenge for the next decade.

Spatial planning

England currently lacks a long-term national framework for spatial planning. A spatial planning framework is required to address the existing imbalances between urban and rural areas, industrial zones and natural reserves and the North-South divide and to respond to new challenges prompted by environmental concerns, migration, technological progress and changing work patterns and lifestyles. Each of the English regions has a Regional Spatial Strategy which in future will be merged with the Regional Economic Strategies, but these are not linked to any national planning framework.

The North of England should coordinate the development of its three regional spatial strategies, perhaps via the Northern Way. Effective use of new EU initiatives such as the EU 'sea highways' policy is important for capitalising on the North's location.

We are sceptical regarding recommendations from the Eddington Transport Study and the Barker Review of Land Use Planning for an independent planning commission which would grant or refuse planning permission for major infrastructure projects. Handing major planning decisions to a nationally appointed commission risks making those decisions too remote from local communities and regional priorities. Local and national interests can best be balanced by reforming the planning system so that planning decisions for transport infrastructure in the North take place at the regional or pan-regional level.

Transport governance and management

As indicated in the Eddington Transport Study, sub-national decision-making in transport suffers from many shortcomings in the North, as it does elsewhere. Five of the North's eight city-regions use the *Passenger Transport Authority/Passenger Transport Executive (PTA/PTE)* model for public transport governance. The PTEs are responsible for local public transport strategy. Their powers are wide but limited, and lacking in some crucial areas; for example PTEs do not have control over highways or bus policy in city-regions, and have increasingly little influence over urban rail services. Moreover, oversight by PTAs, made up of councillors from the local authorities within the PTA area, tends to be weak.

In the Local Transport Bill currently going through Parliament, the Government suggests reforming local transport governance in a number of ways. Much of its content is welcome, in particular the new powers for PTA/PTEs and moves to make urban road user charging easier to introduce. However, there are still areas that will need further reform:

- It is still unclear how city-regions will finance new investment in transport schemes that PTAs and PTEs might want to introduce; the toolkit of current funding options is too limited. A Supplementary Business Rate, as outlined by the Government in its 2007 White Paper, is a promising option.
- The pace of reform may be insufficient – changes to each city's governance arrangements will require secondary legislation.
- City-regions in which the way ahead for reform is less certain or disputed run the risk of being left behind with the existing (inadequate) set of powers. The performance of each city-region should be reviewed a few years on so that underperforming PTEs can be identified and given support.
- The recent decision by DfT to remove PTAs as signatories on rail franchise documents should be

reversed as it is not consistent with a strategy of giving PTAs greater jurisdiction over rail networks in the city-regions.

In addition the Government needs to make sure that areas *outside* city-regions are not left with significantly more dysfunctional transport arrangements than areas inside them. For example, it would be useful to make the additional road user charging powers in the draft Local Transport Bill available to cities and towns outside city-regions. The Northern Way's recommendation for a pan-northern public transport smartcard system would allow people from rural areas in the North to make use of public transport services in towns and cities more easily, and should be supported.

At a regional (and pan-regional) level in the North there needs to be clearer lines of communication and more liaison between the Regional Development Agencies and the main transport powerbrokers – the Highways Agency, Office of Rail Regulation, Network Rail and rail regulators, and airport and port operators as well as the DfT. RDAs should have more influence over transport policy for the North, with a specific remit to make the case for better integration between different transport modes and to facilitate a shift towards lower-carbon transport solutions such as rail, buses and cycling and away from high-carbon options such as aviation and private motor vehicles.

Introduction

This is a report from ippr north's Northern Economic Agenda project, which takes a detailed, penetrating look at the economic performance of the three northern regions of England – the North East, North West and Yorkshire and the Humber. On the basis of the available evidence across a range of different policy areas, the project has formulated policy solutions aimed to enable the northern regions to combine strong economic growth with a socially just distribution of the benefits from growth, in a manner that is consistent with environmental sustainability in general and the need to avert dangerous climate change over the twenty-first century in particular.

This report looks at the economic, social and environmental aspects of the North's transport system. We aim to answer a range of crucial socio-economic questions:

- How can the transport network be improved to better support economic development in the North?
- Can the transport system contribute to faster and more balanced economic growth across the northern regions and city-regions?
- Are the Government's plans for aviation and the road and rail networks compatible with Britain's long-term commitments on climate change?
- What governance arrangements for transport at the national, regional and local level are most conducive to a dynamic, well-functioning pan-northern transport system?

Other reports from this project look at entrepreneurship and innovation in the North (Johnson and Reed 2008) and the economic role of the public sector in the North (Mrinska 2007). Together with a background 'audit' report on economic, social and environmental trends in the northern English regions relative to the rest of the UK (Johnson, Mrinska and Reed 2007a), the three main reports form the evidence base for the final report from this project (Johnson, Mrinska and Reed 2007b), which formulates an overarching progressive strategy for the revitalisation of the northern economies over the next decade and beyond.

Structure of the report

Section 1 sets out a socio-economic framework for assessing transport policy in the North. The framework focuses on three aspects of the impact of transport: how transport facilitates and supports economic growth, its impact on the distribution of economic and social well-being and its impact on the environment and climate change. For a holistic and balanced treatment of transport policy it is essential that we consider all three of these aspects. In particular it is essential that the appraisal of transport investment projects combines an assessment of their contribution to growth with their distributional and environmental impacts. We examine the appraisal framework that the Department of Transport (DfT) uses, and compare it with the approach recommended by Sir Rod Eddington in his review of the UK transport system which reported in December 2006.

Section 2 looks at how the North's transport system compares with other regions of the UK and against other European countries against the criteria that comprise our socio-economic framework for analysing transport policy.

Section 3 looks at the policy issues surrounding northern transport through the lens of this socio-economic framework. In May 2007 the Government published its draft Local Transport Bill, which proposed reforms to the regulatory framework bus services, new options for transport governance at city-regional level, and new urban road user charging powers for local authorities. And in July 2007 the Government published a new Rail White Paper, *Delivering a Sustainable Railway* (DfT 2007a). We assess the recommendations in these recent documents.

We also ask whether the future transport investment priorities identified by the Eddington Transport Study, the Northern Way, the northern Regional Development Agencies (RDAs) and the eight northern city-regions are the right ones, and, where we disagree, we suggest alternatives. In connection with this we look in detail at several specific aspects of future transport investment: first,

the case for high speed surface transport links between the North and the South; and second, policies to reduce greenhouse gas emissions from northern transport. Additionally, we look at how transport networks are managed in the North, asking whether the current arrangements are adequate and if not, what alternatives might improve on the current situation.

Section 4 presents our conclusions.

1. A socio-economic framework for assessing transport policy in the North

Setting the objectives

We argue that transport policy should have three main objectives[1]:

- First (but not necessarily foremost), the transport system should be structured to promote economic prosperity and growth.
- Second, the transport system should be designed and regulated to minimise adverse effects of transport on the environment and to ensure environmental sustainability in the long run.
- Third, the transport system should contribute towards reduction in inequalities and social exclusion where possible.

Obviously in practice these objectives may conflict – which gives rise to policy debates and choices about which objective to prioritise. Also, the different roles played by transport in the economy will inevitably lead to different considerations of these three objectives. For example, freight transport is vital for economic growth, and needs to be designed with the environment in mind, but it is not directly relevant for distributional issues (although it may have considerable indirect relevance). Conversely, there are important distributional aspects to the availability and cost of leisure travel, and it has some consequences for economic growth (via its impact on the tourism industry) but these will not be anywhere near as important as the impact of commuter patterns on growth rates.

How does national government weight these objectives?

Sir Rod Eddington's report *Transport's Role in Sustaining the UK's Productivity and Competitiveness* (hereafter referred to as the 'Eddington Transport Study'), which reported in December 2006 (HMT/DfT 2006), strongly emphasised the importance of providing for business-related transport in the UK (with little mention of transport for reasons other than commuting or other business-related personal travel, and freight). Eddington's emphasis was on investing where the business case is strongest – which means, in practice, where appraisal of transport projects indicates the highest new benefit-cost ratio.

However, it is important to realise that Eddington's approach integrates environmental factors (and, to a limited extent, distributional factors) into the analysis. The Eddington Study recommends that the viability of transport projects be assessed relative to the cost-benefit analysis schema outlined by the DfT in its *Transport Analysis Guidance* documentation (see next page). The DfT's cost-benefit analysis criteria include economic growth, environmental factors, and safety directly in the analysis. Distributional factors are less prominent (although they do feature). What the Eddington Study did *not* explicitly address is the trade-off, as and when it arises, between economic growth, the environment and distributional objectives. In this paper we attempt to shed more light on this issue, particularly as it affects the North of England, by taking a closer look at how transport can contribute to economic prosperity (defined in the widest possible sense) (see also Marshall 2007).

At the end of this section we give a more detailed analysis of how the approach taken by the Eddington Transport Study corresponds to our analytical framework.

1. Although we discuss three main objectives here, an additional objective, no less important, would be safety: the transport system should be as safe as possible, consistent with affordability and practicality. Because safety is more technical an aspect of transport policy than economic, we do not discuss it in as much detail as our three main projects here. However, we do discuss it when it is a key factor in investment decisions over specific transport technologies.

Appraisal techniques required by the Department for Transport

The Department for Transport (DfT) produces detailed guidance for the appraisal of transport schemes. This is primarily for use by agencies promoting transport proposals but can be viewed online at www.webtag.org.uk. The appraisal procedures are based on the New Approach To Appraisal (NATA) originally developed for the 1998 Integrated Transport White Paper by the then Department for the Environment, Transport and the Regions. Additionally, the appraisal framework is in line with the guidance issued in HM Treasury's 'Green Book', *Appraisal and Evaluation in Central Government* (HMT 2002), which sets out a standard appraisal technique for use across government departments. As the DfT's guidance document puts it, 'The Green Book recognises the need to take account of all the economic, social, environmental and financial impacts of an intervention.'

Cost-benefit analysis, defined by DfT as 'analysis which quantifies in monetary terms as many of the costs and benefits of a proposal as feasible, including items for which the market does not provide a satisfactory measure of economic value', is the preferred appraisal option. However, this is not always possible given the current 'state of the art' in appraisal techniques, and so some impacts (particularly on the social and environmental side) have to be appraised using qualitative techniques which are more open to interpretation and offer less clear-cut results. This is because the methods required to assess these costs and benefits in monetised terms have not been developed yet.

Table 1.1 gives a summary of the economic, social and environmental impacts that are taken into

Table 1.1. Measures of impact used in appraisal by the Department for Transport

Impact measure	Primary appraisal method
Environmental:	
Noise	Mixed
Local air quality	Mixed
Greenhouse gases	Mixed
Landscape	Qualitative
Townscape	Qualitative
Heritage of historic resources	Qualitative
Biodiversity	Qualitative
Water environment	Qualitative
Physical fitness	Qualitative
Journey ambience	Qualitative
Safety:	
Accidents	Qualitative
Security	Qualitative
Economy:	
Public accounts	Quantative
Transport economic efficiency: business users and transport providers	Quantative
Transport economic efficiency: consumers	Quantative
Reliability	Mixed
Wider economic impacts	Mixed
Accessibility:	
Option values	Mixed
Severance	Qualitative
Access to transport system	Mixed
Integration:	
Transport interchange	Qualitative
Land use policy	Qualitative
Other government policies	Qualitative

Note: Mixed = combination of quantitative and qualitative.
Source: DfT (2007), Units 2.1.4 and 3.2. Online at www.webtag.org.uk (accessed April 2007)

account in transport project appraisal. It should be noted, in particular, that although environmental issues are incorporated into the appraisal process in detail, distributional considerations are not directly incorporated apart from the 'accessibility' category. However, the Green Book guidance recommends that benefits to transport investment should be adjusted to reflect the impact of proposals on different income groups. This is not done in a systematic way currently in DfT. Rather, the core appraisal is supplemented by an analysis of 'distribution and equity' which looks at distributional implications of transport schemes across regions, rural/urban areas, gender, race and so on.

The framework also includes allowances for risk and uncertainty (the fact that returns to a transport project are unknown *ex ante*, but only *ex post*) and optimism bias (the phenomenon whereby previous estimates of the net returns to investment in transport projects have systematically underestimated the costs compared with the out-turns).

Additionally the DfT guidance recommends, in line with the Green Book, that a discount rate of 3.5 per cent per year is used to discount future costs and benefits.

In May 2007 the then Transport Secretary Douglas Alexander committed the DfT to refreshing the NATA framework over the coming 12 months in the light of the Eddington Transport Study.

Transport's contribution to economic growth and prosperity

Transport in the production process

The standard model of production in economics is the 'theory of the firm'. In this model, firms combine the inputs or 'factors of production' (land, labour and capital) to produce outputs (commodities) which are sold on the market. In the simplest version of the theory, firms are assumed to be 'price-takers' when purchasing inputs (that is, they are too small for the amount they purchase to affect the market price). The assumption is that firms maximise profits; for a given level of output, this implies that costs are minimised.

This is obviously a hugely simplified model, but it is nonetheless possible to analyse the economic role of transport in the production process even at this level of abstraction. Transport is part of the costs of production. It is costly to transport inputs (labour, capital equipment and intermediate goods) to the workplace; and also to transport finished goods to retail outlets or final consumers. Transport costs include explicit costs to firms (for example, freight cost for goods, and the cost of business trips for workers) and explicit costs to workers (principally the costs of commuting). Additionally, there are implicit costs of transporting workers – for example, a long commute cuts into the time available for other leisure activities, and a person on a long business trip may not be as productive during the time spent in transit as they would be in the office. Hence, improvements in the transport system have an economic value to the extent that they reduce costs.

The upshot of all this is that economic welfare is higher than it would have been in the absence of the investment (although of course a full appraisal needs to take account of the costs of the transport investment as well). Note that 'economic welfare' will include, *but is not limited to*, economic output in the National Accounts (Gross Value Added). Reductions in commuting time are a good example of an economic benefit that does not accrue directly to GVA, but instead makes workers better off as they can spend less time commuting and more time doing things they want to do.[2]

2. Note, however, that there can be an indirect effect of reductions in commuting time on GVA through increases in the effective density labour which increase agglomeration benefits (q.v.). Also, the long-run equilibrium effect of reductions in commuting time can be considerably more complex than this due to the possibility that improvements in travel times are capitalised into higher house prices in the area in which the transport investment is made. See Gibbons and Machin (2006).

Classifying the economic benefits of transport investment

Drawing on the DfT's *Transport Appraisal Guidance* framework (DfT 2007b), we can identify the following economic benefits and costs of transport investment:

1. Public accounts impacts

These comprise the costs to central and local government of the transport investment itself and any operating costs (for example, maintenance), any grants or subsidies, and changes in indirect tax revenues and other revenues arising directly from the transport investment (for example, parking charges, congestion charges, road tolls).

2. Transport Economic Efficiency impacts

These comprise the net user benefits from transport to both consumers and businesses, including both personal and freight travel. The key items included in this calculation are:

(a) Changes in (average) travel time. These have to be assigned a monetary value to be usable in the overall cost-benefit calculation. The standard assumption in DfT appraisals is that working time savings are valued at the hourly wage rate, whereas non-working time savings are derived from surveys of transport users' willingness to trade money for time.

(b) Impact of changes in user costs of transport. These are easier to calculate as the user costs are in a monetary value to start with. This category includes 'upfront' charges for use of a transport route (for example rail or bus fares) and also changes in vehicle operating costs met by the user (for private car and goods vehicle transport).

3. Impacts on the reliability of transport services

More reliable transport services deliver benefits through fewer delays to travel, and greater certainty over journey times. However, it is not straightforward to attribute a monetary value to changes in the reliability of transport services and so improvements in reliability are normally only included in the appraisal process qualitatively.

4. Wider economic impacts

Recently, it has been recognised that transport investments may have wider economic impacts than have typically been considered in the appraisal process. A recent DfT paper (DfT 2007c) outlines four different kinds of wider economic impact:

(i) Agglomeration externalities, which arise from the fact that investments can affect the 'effective density' of employment, which, if there are positive externalities to clustering of firms and workers within industries, can have a knock-on effect on GDP *over and above the impact of the firms and workers directly affected by the transport investment*. Rice and Venables (2005) estimate that a 10 per cent reduction in all travel times across the UK would yield a 1.1 per cent increase in UK productivity through agglomeration effects, although this result is highly sensitive to the way 'effective density' is defined and should not be taken as a direct guide to policy. Full explanations of the theory behind agglomeration externalities are given in Graham (2006) and Webber and Athey (2007). Agglomeration externalities are generally thought to be the wider economic impact with the largest magnitude of the four considered here.

(ii) Impacts arising from the presence of *imperfect competition* in transport-using industries due to the presence of increasing returns to scale. The DfT estimates that this effect could add about 10 per cent to the gross benefits from a transport investment.

(iii) Estimates of the impact of transport in *improving competition in transport-using industries*. However, DfT (2006c) estimates that this impact is close to zero in the UK because there is already an extensive transport network.

(iv) Aspects of the *economic benefits of increased employment and productivity arising from commuting time savings* which are not captured in the TEE impacts listed earlier – for example the

benefits to the Exchequer of increased tax receipts arising from higher GDP as a result of a transport investment.

This list comprises the full set of economic impacts considered in the standard appraisal regimes used by DfT. It is important to recognise that any distributional consequences or environmental effects from transport investment are accounted for *separately* from these economic impacts, that is, under the headings of 'environment', 'accessibility' and 'integration' in Table 1.1 above. A full assessment of the viability of a transport investment should of course include distributional and environmental impacts, and we turn to these below.

Transport and distributional objectives

While investing in the transport system to facilitate economic growth is important, few would see the maximisation of growth as the be-all and end-all of transport policy. The extent to which transport affects the *distribution* of resources also matters.

Transport provision can have both direct and indirect impacts on the distribution of economic resources and opportunities, and on social inclusion and exclusion. In direct terms, the cost of certain forms of transport can put them out of reach of the poorest groups in society. For example, analysis of the UK Family Resources Survey shows that 62 per cent of the poorest fifth of households in the North East do not own a car or van (excluding households where all household members are aged over 75), compared with 36 per cent of the poorest fifth of households in the South East and 29 per cent in the East of England[3]. While some households may not own a car simply because they prefer to use other means of transport to get around (particularly in urban areas), there is certainly some element of affordability driving these differentials in car ownership.

The accessibility of transport can also differ according to social group. Transport is by its nature a spatial phenomenon and to the extent that different localities are better or worse served by buses, trains and the road network, this can exacerbate, or reduce, inequalities. Additionally, some members of the population are less mobile than others (due to mobility-limiting disabilities, for example) and can face disadvantage and discrimination from poorly designed and inaccessible transport systems. For example, the Social Exclusion Unit reported in 2003 that only around 10 per cent of trains and 29 per cent of buses currently meet the requirements of the 1995 Disability Discrimination Act, which on the face of it, places large parts of the public transport network out of the reach of many disabled people (Social Exclusion Unit 2003, Pillai *et al* 2007). Additionally, the incidence of anti-social behaviour connected with public transport in particular varies for different locations (Social Exclusion Unit 2003).

There can also be indirect distributional impacts of transport provision. A decision to improve transport provision *within* a given local area – for example, upgrades to commuter rail links into Leeds – is likely to lead to increased economic growth around the Leeds city-region area, due to the reductions in travel costs associated with that investment. If the Leeds commuter rail investment were made instead of an alternative investment focusing on the links *between* regions – upgrading the trans-Pennine rail link, for example – there would probably be a different spatial pattern of economic growth than if the trans-Pennine link had been upgraded instead of investing in Leeds. This means that the decision to go ahead with a certain set of transport investments – which will always involve difficult choices because the funding pot for transport investments is finite – can impact on regional economic inequalities in growth and prosperity, which feed through to household living standards. Variations in transport provision can also give rise to wealth inequalities if the benefits of fast commuter links into work are capitalised into higher house prices on commuter routes. Gibbons and Machin (2006) survey a large quantity of evidence showing that this has repeatedly occurred in the UK.

Ideally, all of these distributional impacts should be taken into account when making decisions on

3. Source: author's calculations based on 2003-04 Family Resources Survey. More recent waves of FRS do not contain information on vehicle ownership. The vehicle ownership question in 2003-04 was not asked of households in which all members were aged 75 or over.

transport investments. However, this cannot be done without making an explicit value judgement on how much importance society attaches to distributional considerations (the way the economic 'cake' is cut up) compared with economic growth (the size of the 'cake'). As explained earlier, while distributional factors are not ignored in DfT's appraisal of transport projects, neither are they put centre stage. Distributional considerations are not included in the main set of impact measures shown in Table 1.1 above.

We recommend that DfT updates its transport appraisal guidance to give a more explicit role to distributional considerations. This can be done using a tool called a social welfare function, which allows the weights allocated to different households in the appraisal of economic benefits to be modified so that schemes which reduce inequality have an additional positive impact on welfare (see Box 1.1). The data requirements of this would be quite substantial as it would require assessments of how transport projects would affect individuals and households rather than just average estimates of the impact of a project on a given area. At the very least, data on household incomes from sources like the Family Resources Survey and Labour Force Survey would have to be used to estimate the impact of transport schemes on households at the smallest unit of disaggregation possible; given the current sample sizes of these surveys, this is probably the local authority level.

Box 1.1: Social welfare functions and their possible role in transport appraisal

The social welfare function (swf), first proposed by Bergson (1938) and codified by Samuelson (1947), is an important tool in welfare economics, used for assessing the relationship between alternative outcomes or 'states of the world' (for example the decision over whether to invest in transport project A, or alternative project B, or to not invest at all) and social well-being. To be workable as a tool for transport investment appraisal the function requires two things:

1. Comparable information on the well-being of a representative sample of individuals affected by the transport investment (ideally all individuals affected would be surveyed but this is not practicable on cost grounds). As well-being (or 'utility' in economics-speak) is not directly measurable, an observable proxy is used – for example income (although this gives rise to many of the problems with 'narrow' economic measures of well-being mentioned in Johnson *et al* 2007a).

2. A functional form specifying the relationship between individual well-being and social welfare.

The functional form chosen for the swf will reflect the value which society places on the distribution of well-being relative to the total amount of well-being. This is a value judgement rather than an objective issue. Assuming for simplicity that income is used as a proxy for well-being, an example of an 'income-maximising' social welfare function is:

$$W = Y1+Y2+\ldots+Yn$$

Where W is social welfare and Yi is the income of individual i in the society of n people.

Here, the only thing that matters is the total income of society, and the distribution of incomes is irrelevant.

An example of a function concerned much more with social justice would be the 'Rawlsian' swf, where only the income of the least well-off person in society is taken into consideration:

$$W = \min(Y1, Y2,\ldots, Yn)$$

In reality the social welfare function that a progressive government would be likely to choose would probably fall somewhere between these two extremes – giving some weight to the total value of the economic 'cake', but also how the cake is sliced up between people.

The approach can be adapted to include measures of individual welfare over time, rather than just at one point in time, as inputs into the swf. This is important for appraisal of investment projects where the returns may be realised over several decades.

Environmental factors can be included in the swf if their values are 'monetised' and allocated to individuals so that they can be entered into Yi. Given the current state of appraisal techniques this is possible for some, but not all, environmental factors (see Table 1.1). Hence the swf approach would have to be combined with qualitative appraisal techniques for the foreseeable future.

Additionally, we recommend that *spatial* inequalities should play an explicit role in the appraisal process for transport projects. The Government has an interdepartmental Public Service Agreement (PSA) objective to reduce the gap in growth rates between regions. But as pointed out in Johnson *et al* (2007b), the current PSA does not commit the Government to reducing regional disparities – regional growth rates could converge partially but as long as the Greater South East is growing faster than the North, absolute disparities in GVA per head will continue to widen. As we recommended in that paper, the Government should strengthen the PSA target to aim for reductions in absolute disparities between UK regions. Moreover, transport investments should take contributions of transport projects to regional inequality into account as one of the list of impact measures considered. When a project is projected to cause a decrease in regional inequalities this should be considered as a positive benefit, and vice versa for a project that increases regional inequalities. The impact on regional inequality should not 'make or break' a project's viability on its own but it should certainly be part of the matrix of factors considered in the cost-benefit analysis. This would require a more explicit treatment of spatial planning in the transport appraisal process than currently happens in the UK; we discuss this in more detail in section 3.

Of course, transport policy should not be decided in isolation from other parts of government policy and it may well be that transport investment is not the best policy mechanism for pursuing explicit distributional objectives. Thus, the Eddington Transport Study points out that many urban light rail and tram schemes have relatively poor benefit-cost ratios compared with incremental improvements to the existing transport network (such as extra bus services) and improvements to urban roads, largely because the capital investment costs of trams and light rail pull down the net benefit-to-cost ratio. Many metropolitan authorities push for infrastructure projects like trams on the basis that they have social benefits over and above their 'bottom-line' economic benefits; this is essentially a distributional case for investment (providing greater accessibility for deprived areas, for example). A more explicit role for distributional considerations in transport appraisal would make it easier for these projects to be considered on a level playing field with other transport investments. However, the full range of options should be considered, and it may be that in some cases trams are trumped by other mixes of policies which can provide a similar mix of distributional and growth effects for less money. The advantage of a cost-benefit analysis process – suitably modified to give more of a weight to distributional objectives than the existing process – is that it allows each investment project to be considered in its own terms.

Additionally, it may be that sometimes local democracy overrides central (and regional) agencies' desires for a 'level playing' field for appraisal. It might be the case that, for example, a local authority decides to go ahead with a transport scheme using funding raised from local residents and/or businesses[4]. If local democracy is to mean anything beyond tokenism, then, even if conventional appraisal techniques indicate that the transport scheme is not the investment with the highest benefit-cost ratio of those available, it should nonetheless be allowed to go ahead. However, any schemes which involve a contribution from *central* government or regional agencies (which in practice is most of them, currently) should have to pass the rigorous appraisal standards set out in this section.

Pricing policy is a key tool for realising economic efficiency objectives but can often have distributional goals as well. Conventional economic theory suggests that it is more efficient to

4. For example, Marshall and Harrison (2007) suggest that a Supplementary Business Rate could be used for this purpose. The Government set out proposals for a business rates supplement scheme in a White Paper published at the same time as the October 2007 Comprehensive Spending Review (HMT/CLG 2007).

redistribute income than to subsidise commodities, to achieve distributional aims[5]. The Eddington Transport Study supports this position with its advice to government to 'get the prices right' – ensuring that travellers face the full cost of their journeys.

This does not, however, imply that a bus or train ticket, should cost the same at every time of the day. Because the UK transport system is used to a much greater extent in the morning and evening rush hours, the marginal social cost of journeys made at these times is much higher than journeys made off-peak – both because of the extra congestion costs of peak journeys, and because the bus and rail companies need to run extra services at peak times to accommodate the extra demand. This provides an obvious economic efficiency rationale for pricing regimes that provide discounted off-peak travel to 'rebalance' the load on the public transport system. This is also likely to lead to a more preferable distributional outcome for people on low incomes who are able to travel off peak – many pensioners would fall into this category, for example, and indeed pensioners are currently entitled to free bus travel in their local area in England and Wales (and throughout the whole country in the case of Scotland). However, care should be taken to avoid creating artificial barriers to work by making transport during commuting periods so expensive that it is not economically viable for people with low wage-earning potential to enter work because large amounts of their take-home pay would have to be spent on transport.

Later on in this report we also consider two other important aspects of 'getting the prices right'. One is ensuring that road users pay the full social cost of their journeys, particularly in terms of congestion – which in the long run is likely to involve charging for road use across the national network (see Section 3). The other, explored below, is ensuring that transport users face the costs to the environment of their journeys – which primarily involves ensuring that greenhouse gas emissions from transport are priced correctly.

Transport, the environment and climate change

Just as transport policy cannot afford to ignore distributional issues, equally it cannot afford to ignore environmental issues. As shown in Table 1.1, the environmental impacts of transport measures considered by the DfT in its transport appraisal guidance are wide ranging, including the impact of transport projects on the landscape and on heritage sites, air quality, noise and biodiversity. There are measurement problems with many of these factors, but the principle that environmental effects of transport policies should be factored into an economic assessment of the case for new transport investments is widely accepted.

In this section we devote special attention to the issue of greenhouse gas emissions from transport. With recent research studies (including the Government's own Stern Review [Stern 2006]) showing that climate change over the 21st century is likely to present an even greater danger to human prosperity than was predicted even a few years ago, it is clear that greenhouse gas emissions need to be placed at the very centre of a coherent transport policy in a northern context, as elsewhere. In this section we discuss how environmental factors should be incorporated into an economic framework for analysing the costs and benefits of transport proposals.

Economic growth, climate change, and transport policy

There is a trade-off between the environment and economic growth, but it is more sophisticated than the picture often painted in popular debate. One often hears environmentalist policies criticised as 'bad for growth'; thus, for example, the Government's 2003 White Paper on the future of air travel in

5. In fact, many commodities *are* subsidised in the UK economy (relative to other commodities); for example books, food and children's clothing are zero-rated for VAT purposes. It would be more efficient and more equitable to impose VAT on these items and to increase benefit and tax credit payments to low-income families to (more than) compensate them for the increased prices they would face. Transport is also zero-rated although there is a *prima facie* economic case for doing this on the grounds that transport costs are an intermediate input into the production process. A standard result in 'optimal taxation theory' in economics is that an efficient tax system should not impose taxes on intermediate production goods (Diamond and Mirrlees 1971).

the UK, and subsequent government publications on the same topic (DfT 2003, 2006e), recommend substantial expansions of the UK aviation network – including runway lengthening at Liverpool John Lennon, Newcastle, Leeds-Bradford and Durham Tees Valley international airports on the grounds that this is essential for continued economic growth in the UK. Environmentalists object that growth in air travel on the scale envisaged by the Government is inconsistent with the targets for greenhouse gas emissions required in order to limit average global temperature change to 2°C above pre-industrial levels (Retallack 2005).

The Government's response to this criticism (backed up by the general thrust of the Eddington Transport Study) is that, provided that companies and passengers using air travel face the full costs of their flights – including the 'carbon cost' of the emissions from flying – then there is no contradiction in policy. Britain can expand aviation and meet its greenhouse gas targets at the same time, primarily by reducing emissions in other sectors. A crucial plank of this argument is that aviation only accounts for around 5 per cent of the UK's total carbon emissions at present. Thus, it is quite possible for the amount of flying in and from the UK to increase, while *overall* carbon emissions decrease. Economically, it is most efficient to reduce carbon emissions from sectors where the marginal cost of cutting emissions is lowest. As transport is a sector where, given current technology, emission abatement is relatively expensive, we would expect to see less reduction in emissions from transport compared with other sectors in the short term, given the current transport technologies that exist. (In the long run the pattern of emissions reductions across sectors is very difficult to predict as technological change might alter the relative costs of emissions reduction in transport compared with other sectors.)

However, recent work by ippr (Lockwood *et al* 2007) has pointed out flaws in the logic of the Government's position on aviation. First, the impact of carbon dioxide and other emissions into the atmosphere from aviation is several times more damaging for the climate than for the same amount of emissions on the ground. Second, the huge forecast growth in air travel (from 229 million passengers in 2005 to 401 million passengers by 2020, according to DfT's central estimates in DfT 2006d) will mean that over the coming decades, aviation emissions will become a far larger share of total emissions than they are at present. Third, it is unclear that the mechanisms for making sure that companies and individuals face the full social cost of their air travel will work adequately without further reform and intervention. Currently aviation fuel is exempt from taxation under an international accord, and air passenger duty is neither high enough nor structured in the right way to capture the emissions costs of flying (Leicester 2006). Although it is planned to include aviation companies in the EU Emissions Trading Scheme during its second phase which begins in 2008, the current carbon price per tonne in the scheme is a long way below estimates of the social cost of carbon emissions in recent empirical work (Stern 2006). This is largely due to the way the scheme has been implemented, with governments over-allocating carbon dioxide permits to industry and 'grandfathering' permits rather than auctioning them (Gibbs and Retallack 2006).

Finally, the Government provides wildly mixed messages from different departments on aviation: while the Department of the Environment, Food and Rural Affairs (DEFRA) encourages restraint and offsetting, the Treasury, DfT and Department for Business, Enterprise and Regulatory Reform (BERR) champion the contribution that the rapidly expanding aviation sector makes to the economy. Recent research carried out by the Centre for Cities[6], which convened local stakeholders to discuss their priorities for local and regional transport investment at a number of city locations including Liverpool and Newcastle, found that many stakeholders put an emphasis on expanding regional airports to grow the economy, but that there was almost no acknowledgement of the trade-off between growth in aviation and sustainability objectives (Marshall and Harrison 2007). There is a clear danger that the Government's reticence in stressing the importance of action to reduce greenhouse gas emissions will

6. The research was carried out when the Centre for Cities was based within ippr. The Centre has since become an independent organisation.

exacerbate tendencies to play down the importance of the environment in debates surrounding airport expansion in the North and in other regions.

A possible way out of this dilemma is to acknowledge that while there is a trade-off between policies that pursue environmental objectives and policies that promote narrowly defined short-term growth in Gross Value Added in the economy, maximisation of GVA is an erroneous objective for economic policy, and locking the economy in to a 'high-carbon' path will become increasingly expensive, decade by decade. Instead, policy should be targeting a much wider definition of economic well-being that takes environmental benefits into account. This is precisely what DfT is aiming to do in its own appraisal guidance – although for many environmental factors (such as biodiversity, or noise abatement, for example) the quantitative techniques for valuing these commensurately with GVA are not well developed and qualitative methods have to be relied on.

However, estimating the cost of greenhouse gas emissions is one area where quantitative techniques are well advanced. What is necessary is to percolate the environmental perspective, which is already enshrined in planning guidance, through all Whitehall departments, and regional and local government, so that in *every* case in which a transport project is under consideration, the environmental costs (or benefits) of the project are in the foreground of the analysis. At the same time, the aviation example shows that effective policies for passing the social cost of greenhouse gas emissions on to transport users have to be in place for the cost-benefit framework envisaged by the DfT (and the Eddington Transport Study) to be meaningful. Only if travellers are facing the full social cost of transport emissions are we likely to achieve the 'modal shift' to a low-carbon transport system, which is essential in the long term.

The Eddington Transport Study

Sir Rod Eddington was jointly commissioned by the Chancellor of the Exchequer and the Secretary of State for Transport 'to examine the long-term links between transport and the UK's economic productivity, growth and stability, within the context of the Government's broader commitment to sustainable development' (HMT/DfT 2006: 1). This subsection looks in some detail at how the approach taken by Eddington compares with the priorities identified in the analytical framework which we have developed in this paper.

It is important to note that the Eddington Study recommends a general approach to transport investment rather than giving views on which specific transport projects should or should not be undertaken. Also, Eddington is explicitly 'mode-neutral': the Study examined all forms of transport and transport investment alongside each other rather than focusing explicitly on aviation or public transport.

Eddington recommends that the choice of transport projects be undertaken in a 'rigorous and systematic' cost-benefit analysis approach. Crucially, the report recommends that this analysis should use a 'Value for Money' framework which incorporates the environmental and social costs and benefits of transport projects as much as possible:

> 'The value for money assessment is the most complete 'single measure' of transport's impact on the UK, as it incorporates the fullest possible estimate of a proposal's economic, social and environmental impacts. However, those estimates are more uncertain than the conventional BCR because the evidence base is relatively new, and some of the effects are inherently hard to monetise.' (HMT/DfT 2006: 125)

The report's key conclusion is that the Government should invest in transport projects where the benefit-to-cost ratios (BCRs) are highest (after taking into account environmental factors). This leads to several recommendations:

- For the most part, smaller-scale transport investments which aim at using the existing transport system better (for example road traffic management schemes, pricing schemes to encourage a more even distribution of passengers on public transport) and incremental

investments in existing transport networks (for example lengthening trains and station platforms, widening roads) offer better returns than large-scale fixed infrastructure investments (for example new train lines), mainly because the latter are so expensive. Small-scale and incremental investments on the existing network also have a smaller environmental 'footprint' than large scale investments and so are better for the environment.

- Transport spending should be prioritised at 'pinch points' where a clear constraint on growth has been identified, for example: (a) congested and growing city catchments, (b) key inter-urban corridors, (c) key international gateways (such as Manchester Airport, the Teesside ports [Teesport] and the Port of Liverpool) that are showing signs of increasing congestion and unreliability.
- Large-scale 'step change' investments such as the 'Maglev' system proposed by UK Ultraspeed (2007), which (Eddington claims) rely on speculative assessments of the potential benefits, and new technology, are unlikely to be the best use of scarce transport resources. However, in subsequent evidence to the House of Commons Transport Select Committee Eddington has made it clear that he does not rule out large-scale investments based on more conventional technologies (for example High-Speed Rail; see House of Commons [2007]), if the BCR is high enough.

Is the approach of the Eddington Study the right one? We would certainly not dispute its central recommendation that transport projects should be chosen on the basis of a rigorous and systematic cost-benefit analysis (CBA). There is a real issue as to what the criteria for the CBA should be, however. Eddington argues for a 'value for money' appraisal based on 'highest benefit to cost ratio [BCR]' approach, with the BCR adjusted to take account of environmental, and to a certain extent distributional, effects. This is an excellent idea in theory, but in practice (as we saw earlier in this section) many of the environmental impacts used in DfT appraisals *are not measured quantitatively*. This means that there is no clear-cut technique for combining a CBA of a transport project from a narrow GDP perspective with a CBA of the environmental effects in a way that can make the two 'stack up' together easily.

As for distributional effects, Eddington says yes to their incorporation in theory, but his report does not indicate how this should be done in a systematic way. For one thing, DfT best practice on transport appraisal does not include an explicit assessment of the distributional effects of transport programmes in the main CBA calculation. Even if it did, economic theory tells us that the exact weight that society should assign to distributional considerations as opposed to economic efficiency considerations will be different according to what 'social welfare function' the analyst uses (as explained in Box 1.1 above). For example, if a transport investment generates an additional £1 of income for a person in the poorest decile (tenth) of the income distribution, how does it compare (in social welfare terms) to an investment which generates an additional £1 for a rich person? Intuitively, many people would say that the former investment is preferable as it helps equalise the income distribution, but this is a value judgement, and there will be perfectly legitimate differences of opinion between different observers.

The upshot of this is that the Eddington Study makes the right overall judgements as to how transport appraisal should be done in an ideal world, but glosses over the practical details of what is possible with current appraisal techniques and technology. As explained earlier, we recommend that the DfT, and local transport authorities conducting project appraisals, should take distributional issues explicitly into account by using social welfare functions and individual-level data in the appraisal process where possible.

Confining ourselves (for a moment) purely to the choice of transport investments to maximise economic growth, does the Eddington Study produce the right guidelines for policy action? In the short run, the answer is surely yes. The analysis of the BCRs of different types of projects presented in the review demonstrates convincingly that projects that contribute towards using existing fixed transport infrastructure better, or that invest in additional variable capacity on fixed infrastructure, have higher BCRs on average than projects that construct new fixed infrastructure.

The main reason for this is that the costs of new fixed infrastructure (especially railway lines, and airports) are so high that they at least partially offset the increased benefits, lowering the overall BCR[7].

Additionally, many 'better use' and 'variable infrastructure' projects have much shorter lead times than 'fixed infrastructure' projects and can hence make more of a difference in the short run. Given the pattern of transport investment over time shown in Figure 2.7 of this report (p31), one can persuasively argue that the current plethora of 'pinch points' in the North (such as the Manchester Hub and the access routes to major ports) and elsewhere represents the outcome of a long period of persistent underinvestment in the transport system, coupled with a 15-year period of economic expansion. If the next few years of transport investment can be targeted on projects with high BCRs, and – crucially – if sufficient funds are made available to reverse the underinvestment in the system, then the Eddington recommendations make good sense as a short-term strategy.

In the longer run, however, there is a danger that Eddington's recommendations are misinterpreted as meaning that the UK does not need to invest in large-scale transport projects – which would be a big mistake. Although more 'pinch points' will continue to emerge in future (especially if there is high overall growth in the economy, and/or a large amount of change in the sectoral composition of British industry), there should be less of a backlog of these (and ideally no backlog) if transport investment is well targeted. This means that over a longer timescale transport investment policy needs to focus on larger projects with longer lead times and more requirements for new fixed infrastructure spending, as it is these projects that are likely to have the greatest transformational impact on the North's (and the nation's) economy. The projects to invest in will need to be chosen carefully, but a blanket refusal to invest in large-scale projects is very unlikely to be the best long-term solution. Over time, technological changes in transport technology, and changes in the sectoral and regional make-up of British industry, mean that there is likely to be more of a case for large-scale interventions – including 'transformational' or 'step change' interventions.

To be fair to Eddington, his report does not rule out large-scale interventions and he has expressed support for large-scale schemes like London's Crossrail in briefings following the report's release (for example, House of Commons 2007).[8] But it is important that policymakers do not take his general point – that small-scale schemes often offer the best BCRs – as meaning that large-scale schemes are never worth investing in; this would be a big mistake for UK transport policy. Certainly, large-scale fixed infrastructure investments are likely to be harder to do an accurate cost-benefit analysis on, and the benefits from them are likely to be more uncertain due to the long lead times and the magnitude of their impact on the economy – but 'more uncertain' is not necessarily the same as 'smaller'. It is perfectly possible for a large-scale transport project to have a very uncertain estimated return but a very high 'expected' (average) return. In this case, it would still be worth proceeding with the investment.

The recent Comprehensive Spending Review sets a relatively tight spending envelope for the DfT's budget of 3 per cent per year nominal increases, meaning that public spending on transport will continue to fall as a percentage of GDP – as it has done since the early 1990s (see Section 2 for details on this). Given the tightness of the spending supplement, as Marshall (2007) points out, it is imperative that the Eddington Study not be used as an excuse for the Government to severely curtail the growth of transport spending on the grounds that all the viable projects are small-scale. As we

7. It should be noted that, because the full 'value for money' appraisal framework recommended by Eddington has not been used in most previous transport appraisals, he is forced to use narrower BCR measures conducted using the conventional NATA framework. However, it is unlikely that re-appraisal of the projects covered in Eddington using the wider value for money framework would alter the fundamental conclusions he draws, although it might have considerable impact for projects that are marginal under conventional appraisals but that offer large environmental or social benefits.
8. The Eddington Study itself contained no recommendations for specific projects, as the remit originally specified by the Treasury was to give recommendations for overall transport investment priorities rather than specific individual projects.

have seen, such a position would be a misrepresentation of the evidence. Assuming that cost-benefit analysis techniques can identify the transport investment projects with highest net value for money, then to maximise quality of life the UK should invest in transport infrastructure until the marginal benefit from doing so is outweighed by the marginal cost, taking into account distributional and environmental factors as much as possible. The analysis presented in this report suggests that we are currently a very long way from that point and there is plenty of scope for increasing investments in transport to realise extra returns, provided that this is done in a manner consistent with the transition to a 'low-carbon' economy, and that the additional investment does not exacerbate inter-regional or intra-regional inequalities (see Box 1.2).

Box 1.2 Transport investment: public finance issues

Of course, just because transport investments have a positive benefit-to-cost ratio (BCR) does not mean that they will take place. In practice one of the main obstacles to funding transport projects with high benefits but also high costs has been lack of availability of finance in the first place – this is a key issue with the proposed Crossrail scheme for London and surrounding areas, for instance. Despite the fact that a series of studies have shown that the BCR is high, the Government has been unwilling to commit upfront finance via borrowing, and it has been difficult to attract private finance on the scale necessary to give the project the go-ahead.

There are two main issues here. One is the Treasury's Sustainable Investment Rule which limits national debt to 40 per cent of GDP. On current projections the national debt will be very close to this level for a number of years and so, unless the Rule is relaxed in some way, additional Government borrowing on the scale required to finance major transport investments will not be possible.

The other main issue is the difficulty of raising private finance on a large enough scale to fund major transport projects. The experience of Eurotunnel, where the original investors in the 1990s lost most of their investments as the tunnel went into receivership, may have put private investors off large commitments to UK transport projects.

Nonetheless, it should be recognised that if the cost-benefit appraisals of transport projects are accurate, then failure to go ahead with transport projects with a high BCR due to lack of finance imposes a large implicit cost on the UK economy and must be viewed as economically sub-optimal.

From a distributional perspective, the main problem with Eddington's recommendations is that if there are significant positive spillovers from agglomeration, and/or if lack of infrastructure is a constraint on growth, then a GVA-maximising transport strategy may well involve investing in regions in which GDP per head is *already* highest. This could mean the South getting a higher share of transport investment per head than the North. And within the North it could mean well-performing areas (such as Manchester) getting a higher share of additional spending than poorly performing areas (such as Teesside). From a progressive perspective, we would argue that the need to balance the economic growth and distributional objectives of transport strategy means that crude maximisation of aggregate GVA should not be the yardstick by which transport investment decisions are made. Rather, efficiency and equity considerations should be balanced. We analyse the current regional allocations of public spending on transport in Section 2.

Eddington's recommendation that environmental factors be incorporated as fully as possible into cost-benefit analysis is the right general approach, but it is crucial that environmental costs and benefits are being measured correctly and incorporated into the cost-benefit analysis in a quantitative form wherever possible. As explained earlier, many environmental factors cannot be assigned a monetary cost or benefit under current appraisal techniques. It is crucial that the DfT updates its appraisal methodology to take account of the latest developments in quantitative analysis and modelling. From this perspective, we welcome the DfT's May 2007 decision to update the NATA framework.

Additionally, cost-benefit analysis needs to take account of the fact that a focus on precise and exact evaluation of each individual scheme's cost and benefits may not capture the environmental and social benefits of 'modal shifts' – changes in lifestyle among significant proportions of the travelling public which might make public transport the norm rather than the exception for many journeys. At

both the urban and the regional level, investment in public infrastructure is essential for facilitating a modal shift off the roads and onto rail and buses. This is recognised by the Northern Way (Northern Way 2007a) and in the DfT's 2004 Transport White Paper (DfT 2004) but the Eddington Study is silent on the issue. Eddington's remit was explicitly mode-neutral, but we would hope that a full value-for-money assessment would allow the benefits of modal shift away from cars and domestic air travel, towards public transport, to be factored into the CBA calculations. The weight of transport funding needs to be allocated accordingly, whereas recently the amount available for roads relative to public transport has been increasing rapidly.

In terms of 'getting the prices right' as Eddington puts it, the difference in greenhouse gas emissions between different transport modes needs to be factored into the costs that people face for motoring. However, this needs to be the *total* cost – including infrastructure costs, and the cost of greenhouse gas emissions. These would probably not be the projects delivering highest returns in terms of narrowly defined GVA, but they are the ones that will deliver the highest returns in terms of human welfare.

2. An overview of transport provision in the North

This section gives a descriptive picture of the transport system in the North and compares it to the rest of the UK and also internationally with other European Union countries where appropriate. We begin this section with a look at how the North compares with the rest of the UK regarding different modes of transport that people use for work and leisure travel – driving, public transport, air travel, walking and cycling. We then move on to look at freight, before concluding with a look at transport investment over time and region by region.

Throughout, we view the North's transport system through the lens of the socio-economic framework for transport policy set out above: we are most interested in how the current transport system and trends in transport use in Northern England enhance growth and affect the environment, as well as the distributional implications of current transport patterns.

The need for international comparison

It is important to look at the development of UK transport infrastructure, freight and passenger dynamics from an international perspective, especially in comparison with other EU countries. As a member of the European Union, the UK participates in various initiatives aimed at increasing the efficiency of trans-European transport networks (TEN-T) in line with the principles of the Göteborg (sustainability) and Lisbon (competitiveness) agendas. The core policy document in this area is the EU White Paper 'European Transport policy for 2010: time to decide', which outlines the strategic development of the European transport system in order to contribute to the further strengthening of the European single market. Although transport policy is predominantly led by national governments, there are a growing number of EU-wide policies and projects, especially in spheres such as safety, investment in infrastructure, increasing intra-EU connectivity by rail, roads, air and sea, and telecommunications.

Modes of travel

Car use

We begin this section by looking at car use, which is the dominant mode of transport in the UK. In the UK as a whole, the total distance travelled per year on domestic journeys increased by 62 per cent, or 306 billion passenger kilometres, between 1980 and 2005. Almost all of this increase (290 billion passenger kilometres) has been due to increased travel by car (DfT 2006a). The UK's share of travels by passenger cars in total inland travel is higher than the EU average – 87 per cent of passenger kilometres in 2003, compared with 81.4 per cent in the EU-25. However, between 1995 and 2005 car passenger kilometres increased by 10 per cent, but rail passenger kilometres increased by 39 per cent and bus passenger kilometres by 4 per cent. Car remains by far the dominant mode of transport; growth in rail use has increased over the last decade, but bus use has grown more slowly.

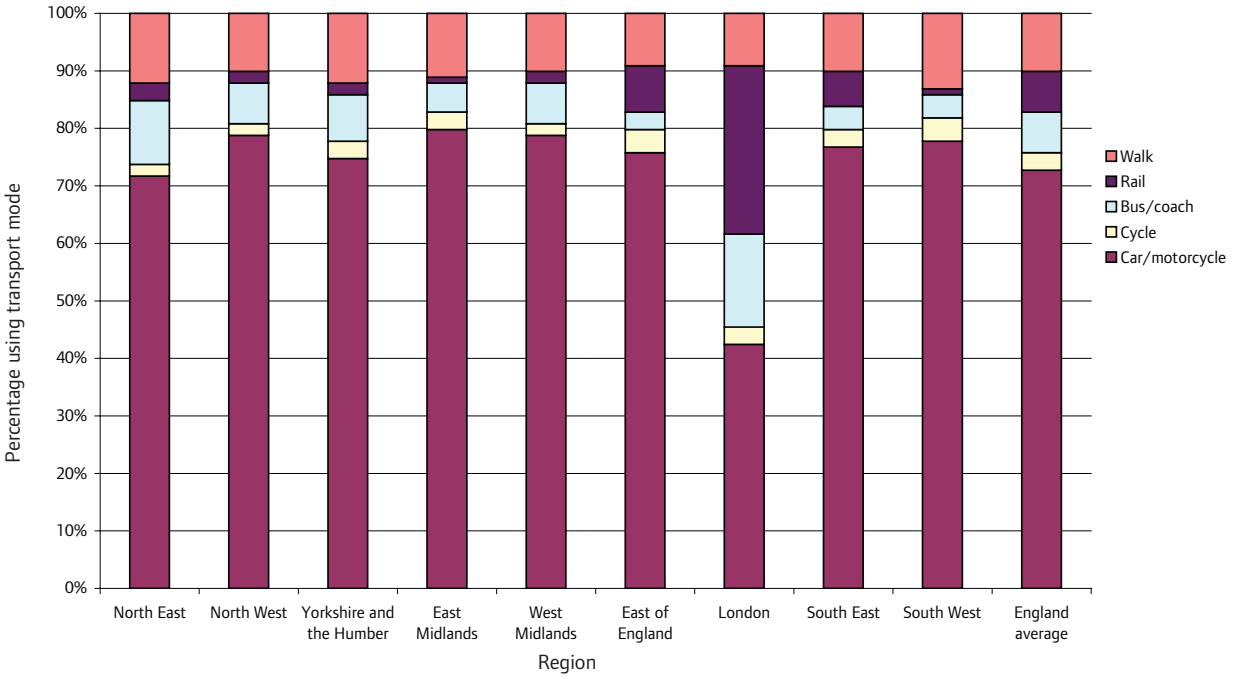
The three northern regions have the highest proportion of households without a car, and the lowest proportion of households with two or more cars, except for London (where transport habits in the main are very different from those in other regions).

Although Northerners are less likely than other regions to own a car, they are no less likely to use the car to get to work. An analysis of usual method of travel to work by region of residence in 2004 shows that the North West and Yorkshire and the Humber had slightly higher than average reliance on the car for journeys to and from work, whereas the North East was about average (see Figure 2.1, next page).

Overall road traffic flows relative to population size are lower in the three northern regions than in any other English region (apart from London). This is true both when considering major roads (motorways and 'A' roads), and when minor roads are included. Traffic increases for the North over the decade 1995 to 2005 were close to the UK average (excluding London).

One of the main symptoms of an inadequate road transport network is high levels of congestion. It is not easy to derive a measure of road traffic congestion by region because of the variation in traffic density within different parts of each region. For example, the North of England has an extensive network of little used rural roads, which experience little congestion in the main, but also key sections

Figure 2.1. Usual method of travel to work by region of residence, 2004



Source: Department for Transport (2006b)

of major routes such as the M1, M6, A1 and M56, which are often heavily congested[10]. It is more useful to compare congestion levels by urban area as this is where most of the congestion in the UK occurs in practice.

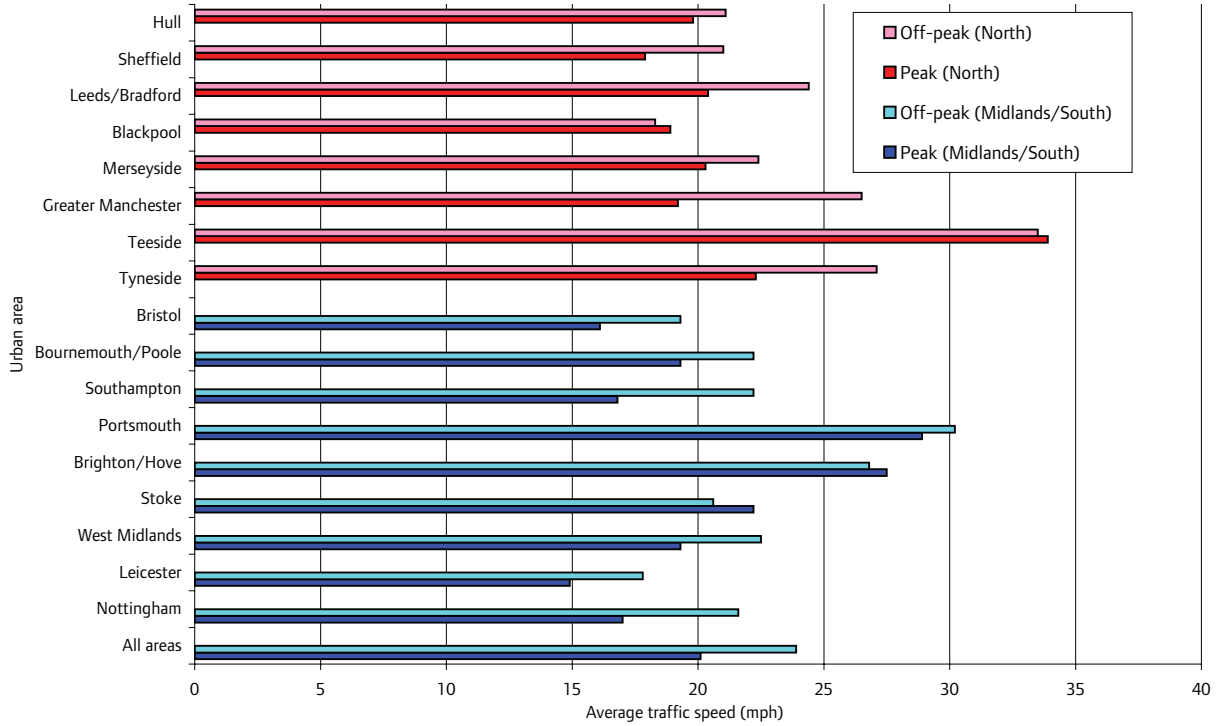
Figure 2.2, next page, gives a breakdown of average peak and off-peak traffic speeds in English urban areas surveyed by the DfT in 2006. Northern urban areas are shown at the top of the graph, with the rest of England towards the bottom. DfT advises that comparisons between areas should be made only with caution as the composition of road networks for the survey varies widely between areas and this can have a major effect on observed traffic speeds. However, insofar as the data can be reliably compared across areas, most northern urban areas seem to have peak and off-peak speeds that are slightly below the average for all urban areas shown at the bottom of Figure 2.2. The slowest northern urban areas in peak hours are Blackpool, Sheffield and Greater Manchester. Teesside has by far the fastest average speed of any urban area surveyed, partly because the road network surveyed there had a higher proportion of dual carriageways than any other area.

Additionally, the condition of the road network in the North East and in Yorkshire and the Humber seems to be worse than for other English regions – they have more road defects per kilometre of road than other regions, and the lowest road expenditure per kilometre of road (except for London) (DfT 2006a).

While the relatively low levels of car ownership in Northern England are probably a result of lower income levels in the North compared with other English regions (as detailed in Johnson *et al* 2007a), the North's relatively high reliance on the car for commuting, high levels of congestion in northern cities and the relatively poor condition of the North's road network are all likely to contribute to a lower quality of life in the northern regions of England than elsewhere.

10. For example, DfT statistics on congestion on the motorway and trunk road network suggest that three of the worst ten routes (in terms of vehicle-hours of delay) between May 2006 and April 2007 fell at least partly in the North: the M6 (J20 Warrington – J6 West Bromwich), the M62 (J33 Pontefract) to the A1 (J18 Whitfield) and the M1 (J19 Rugby – J32 Rotherham). See DfT (2006f).

Figure 2.2. Average traffic speeds in selected English urban areas



Source: Department for Transport (2006f)

Public transport

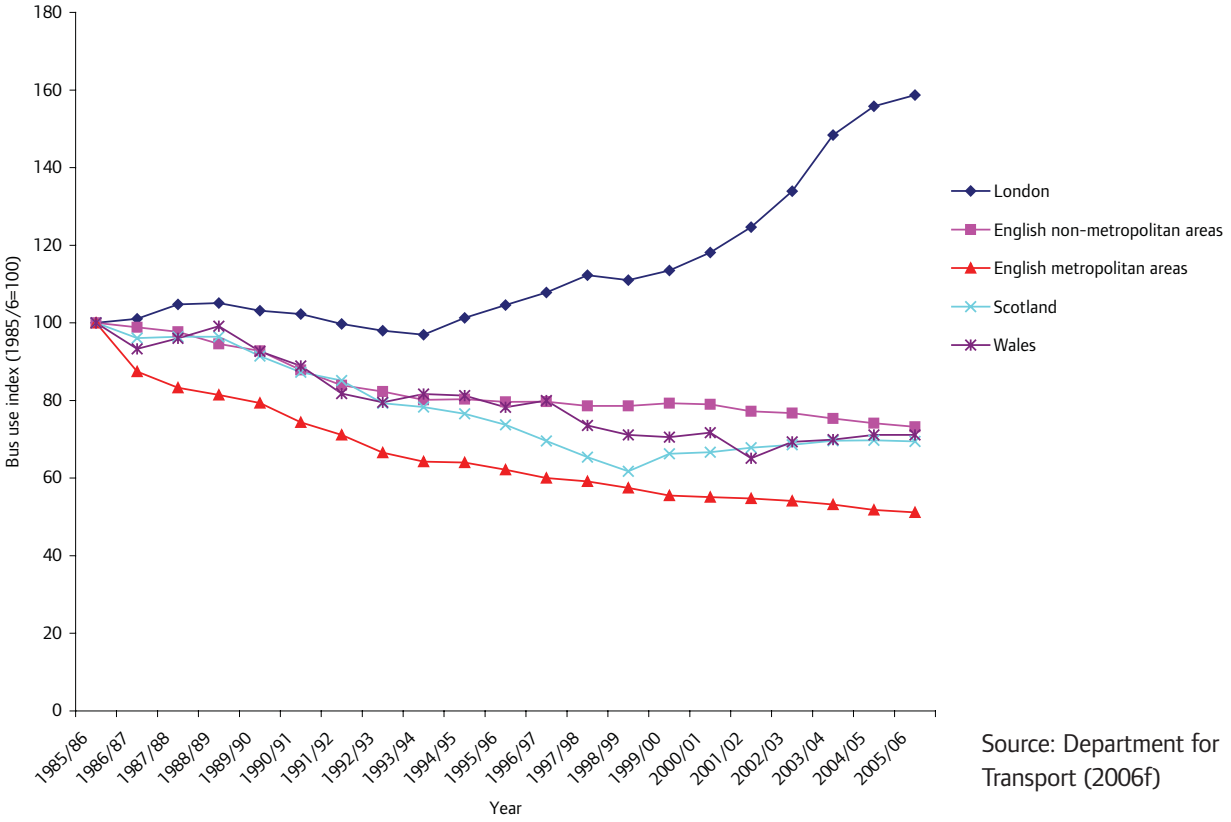
Bus transport is relatively well catered for in the North compared with other English regions (apart from London, which has much more bus use per person than any other region). When surveyed in the 1995-97 National Travel Survey the North East had the highest bus availability[11] of any region at 99 per cent, although this had fallen back to 94 per cent by 2004-05. Similarly, bus travel, measured in terms of the distance travelled per resident head of the population, is at its highest outside London in the three northern regions. The North East has the highest amount of bus travel per head of the population at over 50 kilometres per person per year, but the distribution of bus travel is highly uneven in the population; across the UK as a whole, data from the National Travel Survey shows that 45 per cent of adults use the bus less than once a year, or not at all.

The gap between bus use in London and the rest of the UK is vast: Figure 2.3 shows that bus patronage in London has increased by 59 per cent since 1985-86 but in other English metropolitan areas – including the northern city-regions – there has been a 50 per cent fall on average in the number of bus journeys over the same period. However, some northern towns and cities have bucked the trend: the recent buses White Paper (DfT 2006c) reports that, for example, routes in South Manchester have experienced large increases in patronage over the past few years.

Despite the decline in overall bus patronage outside London, buses are used more for travel to work in the North than other regions outside London, with an average of 9 per cent of northern commuters travelling to work by bus compared with less than 5 per cent elsewhere. In the regions covered by the former metropolitan counties of Tyne and Wear, West Yorkshire and South Yorkshire, around 10 to 15 per cent of commuters take the bus to work.

11. A household with 'bus availability' here is defined as one within 13 minutes' walk of a bus stop with a service at least once an hour – the definition used by the Department for Transport (DfT 2006b).

Figure 2.3. Bus use in Great Britain, 1985-86 to 2005-06

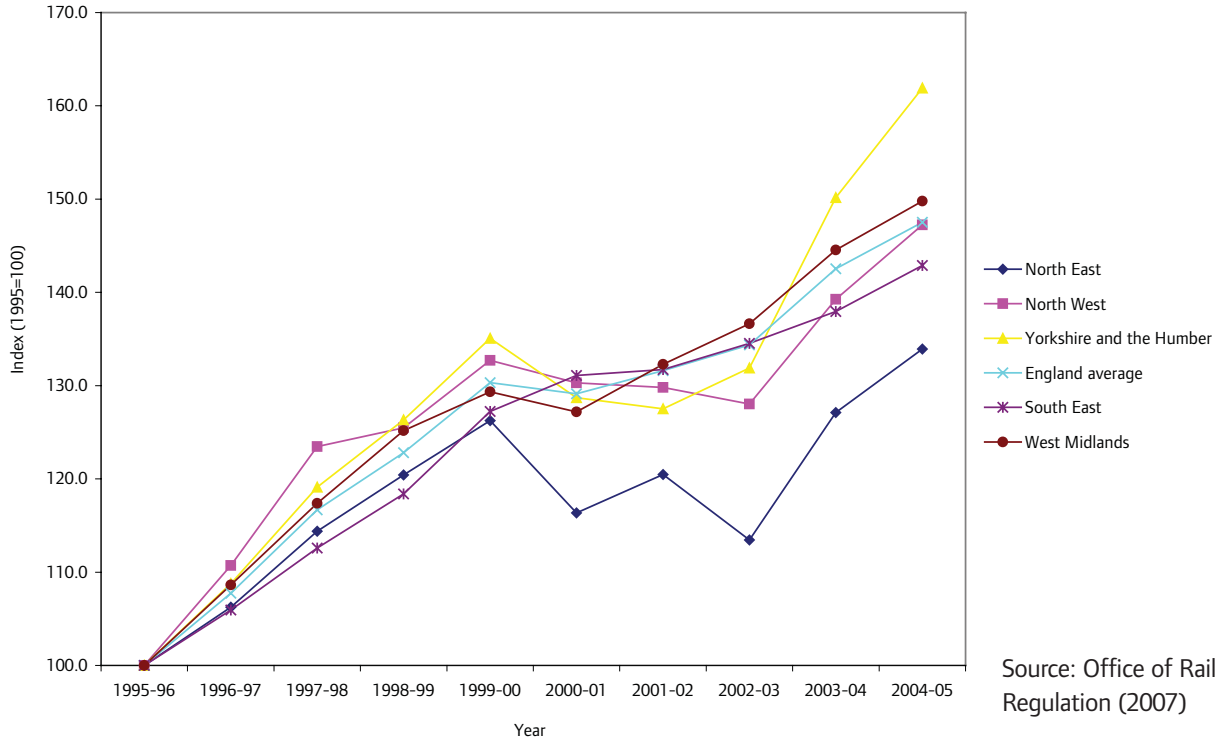


Source: Department for Transport (2006f)

Deriving regional statistics for rail use is harder than for buses, as many rail journeys are long-distance, crossing more than one region. Figure 2.4 shows the growth in the total number of passenger journeys that are either partly or wholly in each region between 1995-96 and 2004-05, for the UK regions, the English average, and selected others for comparison.

Figure 2.4 shows that rail use has grown more slowly in the North East relative to the English average, particularly between 1999 and 2003. By contrast, growth in Yorkshire and the Humber was faster than

Figure 2.4. Regional Rail Use Index for northern regions and selected other regions, 1995-2005



Source: Office of Rail Regulation (2007)

average from 2002 – due mainly to increased services and patronage on commuter lines into Leeds. In terms of number of passengers, rail (including underground and light rail services such as the Tyne and Wear metro) is not a large proportion of travel into work outside of London. Only 2 to 3 per cent of commuters travel to work by rail in each of the northern regions; the proportion in the former metropolitan counties is highest in Tyne and Wear, at 5 per cent. However, rail journeys make up a higher proportion of total passenger distance travelled than number of journeys as the average rail journey is longer than the average car or bus journey. Rail and light rail journeys made up 10 per cent of total passenger distance travelled by all surface transport modes in the North East in 2004-05, 8 per cent in Yorkshire and 7 per cent in the North West, compared with an average of 10 per cent for England as a whole.

Compared with other European countries, the UK has a below average proportion of journeys taken by bus (6 per cent) and by rail (5.3 per cent), against 8.2 per cent and 6.1 per cent respectively in the EU-25.

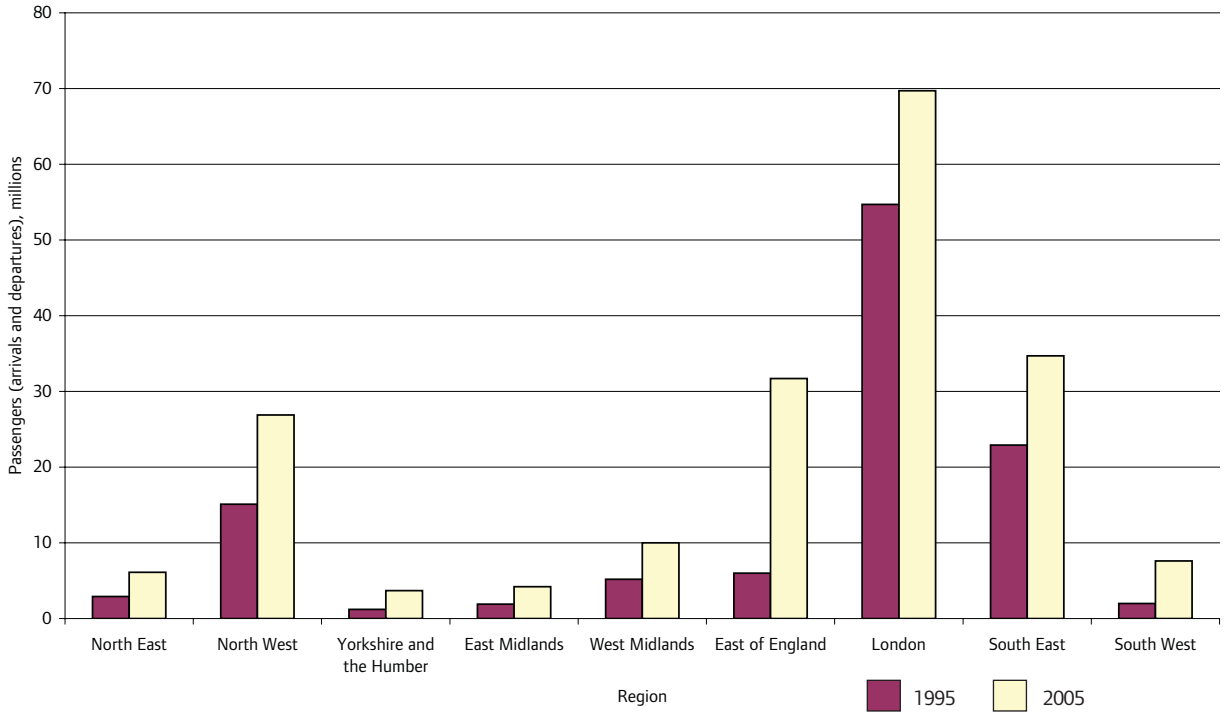
Walking and cycling

Data from the National Travel Survey show that the North East and North West have higher than national average annual distances travelled by walking, but Yorkshire and the Humber is below average. On cycling, the North is lagging behind, with the North East having the second lowest distance travelled of any region during 2002-04 (Wales had the lowest). Yorkshire and the Humber was slightly below average on cycling distance, and the North West was around average (35 miles per person per year).

Air travel

Figure 2.5 shows that in 1995, the North West had the third highest number of passengers arriving or departing at its airports after London and the South East. Between 1995 and 2005 the number of trips taken by air in England grew by 75 per cent – a much higher rate of annual increase than for any other mode of transport. The North West was overtaken by the East of England in passenger numbers over this period, largely due to the growth of Stansted Airport in Essex.

Figure 2.5. Terminal passengers at English airports by region, 1995-2005



Source: Department for Transport (2006b)

Freight

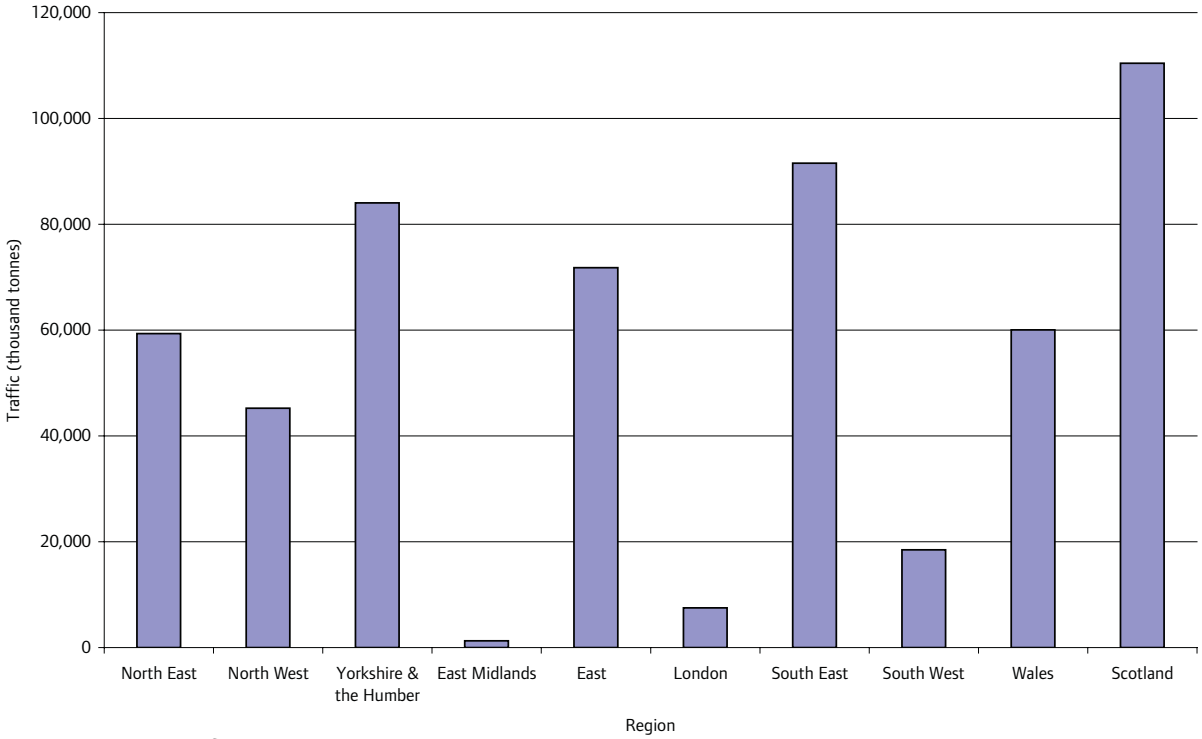
Comparing the UK with the EU as a whole, it is clear that road transport plays a much bigger role in transporting goods in the UK than the EU average. In the EU-25 in 2003, the structure of transported goods was: 40.4 per cent of tonne km of goods by sea, 45.8 per cent by road, 10.3 per cent by rail, and 3.5 per cent by inland waterways (European Road Federation 2007). Across Europe, however, road transport is the fastest growing mode of transport (in 2003-04 road freight grew at 6.9 per cent, compared with total growth of 5.8 per cent).

The picture looks even more disproportionate if we take only inland modes of transport: across the 25 EU countries, the ratio of transport by road, rail and inland waterways is 76 per cent road, 18 per cent rail and 6 per cent waterways, while in the UK road transport constitutes 90 per cent of all freight and the other 10 per cent is transported by rail. In Germany and France, the share of road transport is 68 and 79 per cent respectively, while in Italy, the structure of inland transport is identical to the UK's.

Data from the DfT show that in the UK as a whole, the proportion of domestic freight moved by road was 64 per cent in 2005, compared with 24 per cent by water, 9 per cent by rail and 4 per cent by pipeline. The long-term trend is towards a higher proportion of freight moved by road, although the rate of increase in road's share is slowing. Internationally, the majority of freight arrives by sea – air freight accounted for just 0.5 per cent of total freight entering the UK by weight in 2005. However, air freight has a high value relative to its weight; about a quarter of UK visible trade goes by air. Air freight is also increasing rapidly (by about 40 per cent over the last ten years). The only northern region with any significant air freight traffic is the North West, which accounted for around 7 per cent of total freight lifted at UK airports in 2005.

By contrast, as Figure 2.6 shows, taken together the northern sea ports account for just over a third of Britain's sea traffic. Measured by tonnes lifted, the Humber ports are the most significant port complex in the UK and the Tees ports are second. The Mersey ports are ranked sixth. It is clearly evident that the North's ports are of national as well as regional significance.

Figure 2.6. Foreign and domestic sea traffic at British ports, 2004

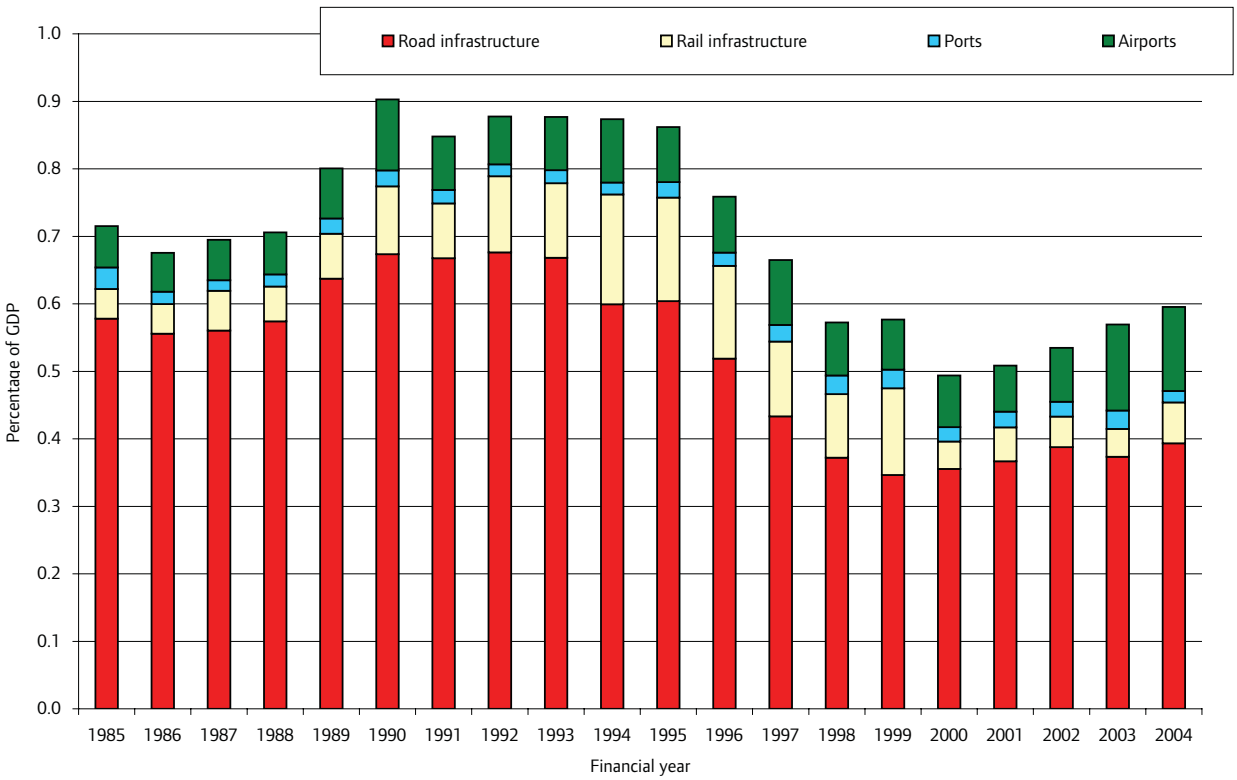


Source: Department for Transport (2006b)

Investment in transport infrastructure

Figure 2.7 shows overall investment (public and private) in the transport infrastructure for different parts of the transport system between 1985/86 and 2004/05 for the UK as a whole. This is not a complete picture of UK transport investment as it does not include expenditure on road vehicles – cars, buses and HGVs – or rail rolling stock. Changes in data definitions mean that it is very difficult to compare a consistent series going back further than this. The figures are shown as a percentage of GDP for each year and include public and private spending (for detailed definitions see DfT 2006a).

Figure 2.7. Transport investment as a percentage of GDP, 1985/86-2005/06



Source: Department for Transport (2006a) and previous years

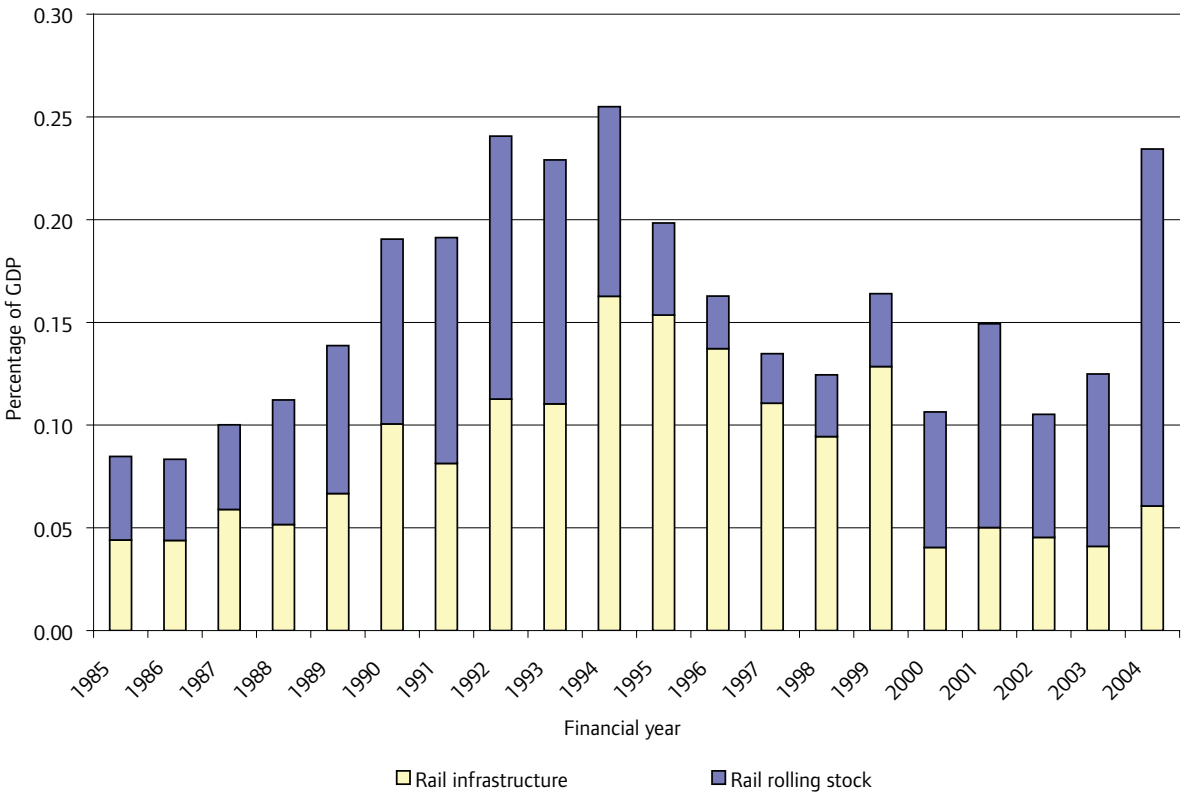
Figure 2.7 shows that transport infrastructure investment as a share of GDP peaked in the early 1990s, due to a combination of high investment in road infrastructure and rail. Road investment fell away after 1993, with the fall continuing for the first three years of the Labour Government. Since then, road investment has rebounded slightly, although not to the levels seen in the early 1990s. But from 1996 onwards, the proportion of national GDP spent on infrastructure has been lower than in any of the preceding ten years. Only airports have seen an increase in investment as a share of GDP in the last decade. Airport investment has also increased rapidly since 2001 in response to planned airport expansion. However, in the Comprehensive Spending Review of October 2007, transport received a tight spending settlement, with increases of three per cent in nominal terms over the next three financial years. If these spending plans are adhered to, then transport infrastructure investment is likely to reduce as a share of GDP between 2007/08 and 2010/11.

The recent Rail White Paper (DfT 2007a) was heavily criticised in the media and by some transport commentators for making an insufficiently large commitment to investment in the railway over the next five years, and for relying too heavily on increased revenue from passenger fares as the main source of investment revenue. The Government's response to these criticisms was that the projected future level of subsidy to rail was in line with long-run historical trends, and it was right that the

passengers who benefit from improvements in the railway should bear most of the costs of railway maintenance and enhancements. We return to these issues in more detail in Section 3 of this paper.

Figure 2.8 shows overall rail investment in the UK including infrastructure (track, signalling and stations) and rolling stock. Rail investment peaked in 1994/95 before falling away rapidly after rail privatisation. However, 2004/05 saw something of a rebound, largely due to increased investment in rolling stock. Nonetheless, rail infrastructure investment since 2000 has been low by historical standards.

Figure 2.8. Rail infrastructure and rolling stock investment, 1985/86-2004/05



Source: Department for Transport (2006a) and previous years

Regional transport spending

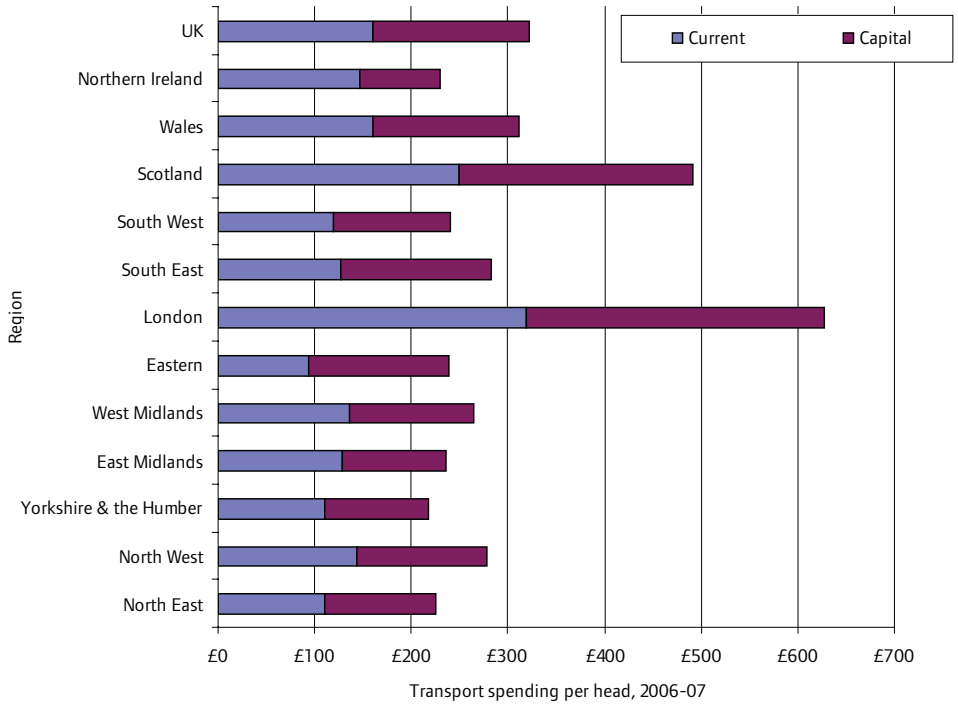
Figure 2.9 (next page) shows a regional breakdown of public expenditure on transport, adjusted for the size of each regional population to show spending 'per head'. Current and capital spending have been added together.

The figure shows significant inequality in spending between regions in 2006/07; in particular, London receives almost twice as much transport spend per resident as the UK average, and Scotland over 50 per cent more than average. The North West receives the highest transport spending of the three northern regions. Yorkshire and the Humber and the North East receive less transport spending per head than any other region.

Of course, there are several reasons why we would not expect transport spending per head to be exactly equal across UK regions.

First, for economic efficiency each region's transport system has to be designed to cope with the peak rush-hour working population rather than just the resident population. We know that London receives a large influx of commuters, from the South East and East of England in particular every working day, so if we were to divide transport spending by the number of people whose workplace is in each

Figure 2.9. Public expenditure on transport per head of the population by region, 2006-07



Source: HM Treasury/ Office for National Statistics 2007

region, rather than the number of residents, the gap between London and the other regions would be smaller (although it would not disappear).

Second, the proportion of a region's population located in major conurbations – cities and city-regions – will influence public spending on transport, as urban areas require higher levels of expenditure on capital-intensive public transport infrastructure such as commuter railways, underground systems and light rail than do rural areas, which mainly rely on the road network. London is essentially one big city-region so once again it is not surprising that it gets higher investment per head on this measure. The gap between Scotland and the other regions is largely explained by the overall generosity of the spending settlement for Scotland (McLean *et al* 2008, forthcoming) plus spending on subsidised transport services to the Scottish Highlands and Islands.

Third, the uneven pattern of regional growth documented in the background audit paper for this project (Johnson *et al* 2007a) creates more demand for transport investment to expand services in the fastest growing regions than the other regions. For much of the last 20 years London has been the fastest growing region in the country, which, combined with the requirements of commuters from the South East and East of England into London, helps explain the relatively high levels of investment in London.

Finally, the uneven flow of investment in large regional transport projects can create inequalities in the flow of transport capital spending at any one point in time. So for example, when the planned schemes to widen the M1 and M62 in Yorkshire and the Humber (see Highways Agency 2008) come on stream, per capita expenditure in that region should increase, at least for the lifetime of these projects. However, it is unclear whether unevenness in capital spending is enough to explain the whole of the gap between Yorkshire's spending per head and the English average. Also, this explanation does not seem to hold for the North East.

Overall, while there are several plausible justifications for the gap in transport spending per head between London and the other English regions, it is less clear why spending levels in the North East and Yorkshire and the Humber are lower than elsewhere. We recommend that the DfT reviews its

future funding allocations resulting from the 2007 Comprehensive Spending Review to make sure that the North East and Yorkshire and the Humber are getting their fair share of funding.

Summary

In summary, the data examined in this section show that the profile of the North on most transport statistics is similar to the English regions outside London, but very different from London, where public transport is much more widely used than anywhere else. But the North lags behind in some key dimensions: its regions receive less public funding for transport per head than other regions and its roads are in worse overall condition than anywhere else in England. Most importantly, the data reveal that in the North – as with all other English regions outside London – the overwhelming reliance on the car as the main means of transport, fast rates of growth of air travel, high levels of traffic congestion and declining bus use mean that substantial investment in transport infrastructure and reform to transport governance will be required to deliver world-class transport services in the North of the future.

3. Current transport policy in the North and recommendations for change

In this section we examine key areas of recent and future transport policy in the North, using the analytical framework developed earlier in the paper. We begin by analysing the future policy statements and plans for transport produced by the main public sector agencies with responsibility for transport in the North: the Northern Way, the three northern Regional Development Agencies and the eight northern city-regions. Next, we make recommendations for future northern transport investment strategies across the three major passenger transport modes in the North – road, rail and air. Finally, we look at the arrangements for the governance of transport policy at the local, regional and pan-regional levels.

Future plans and policy statements

The Northern Way's transport vision

The Northern Way Growth Strategy, published in 2004, identified the importance of transport to the transformation of the North's economy. The three overall transport investment priorities identified by the Northern Way are:

1. Improved access to northern airports
2. Improved access to sea ports
3. Better transport links within and between city-regions.

In March 2007 the Northern Way published a policy document *Strategic Direction for Transport* (Northern Way 2007a), which sets out its priorities for transport policy in the short term (defined in the document as the period up to 2011), the medium term (2011 to 2016) and the long term (after 2016). A second document, *Moving Forward: Short, Medium and Long Term Transport Priorities*, was published in September 2007 (Northern Way 2007b).

For the most part, the policy suggestions for investment in the UK transport infrastructure which the Northern Way produces fit snugly within the framework suggested by the Eddington Study analysed in Section 1 above. For instance, the report recommends that transport investment over the short to medium term should be focused on particular bottlenecks in the North. Three major examples are given: the trans-Pennine rail link (which is much slower than most of the major rail routes in the UK), the Manchester rail hub (which is a principal bottleneck in the rail system due to lack of track capacity in central Manchester) and increasing road and rail transport capacity on the approaches to the major northern ports on the Humber, Tees and Mersey rivers.

Above and beyond these, the analysis concludes that for the most part, network and demand management measures will be a more cost-effective way to enhance the North's transport network than major new infrastructure investments in the short to medium term, although not in the long term. For example the report states that 'the rail network across the North is remarkably comprehensive (although with some long-standing constraints). It is therefore possible to achieve a substantial improvement in travel conditions and offer capacity for growth without the need for new infrastructure simply by lengthening existing trains' (Northern Way 2007a: 18).

The Northern Way reports do make some recommendations for transport investment which go beyond the Eddington prescription. These are based on two simulation analyses of the impact of transport spending on economic growth via agglomeration benefits carried out in preparation for the Northern Way report by the consultancy Steers Davies Gleave. The first simulation analysis used a model of agglomeration benefits for the entire North based on a model of productivity at district level (Steers Davies Gleave 2006a). The second used a dynamic simulation model of the South and West Yorkshire economy to estimate the spatial distribution of the productivity and employment impacts of various transport investment options for South and West Yorkshire (including the benefits arising from agglomeration effects) (Steers Davies Gleave 2006b). The analyses use the DfT's own methodology for calculating agglomeration benefits.

The outputs from this work cannot be interpreted in terms of cost-benefit analysis as monetary values are attached to the agglomeration benefits from transport interventions, but not to the costs of transport interventions which would secure these benefits.

However, three conclusions emerge from the overall results. First, investments in transport infrastructure *between* city-regions have the largest agglomeration benefits of any transport investment[12]. Second, improvements *within* city-regions can also lead to substantial and worthwhile agglomeration benefits.

Third, a combined programme of transport investment within city-regions and between city-regions delivers more distributionally balanced growth in the North than a programme focused on links within city-regions or between city-regions alone. This conclusion suggests that transport policymakers do not necessarily face a trade-off between on the one hand a strategy that *maximises* growth but leads to increased inequality, and on the other hand a strategy that increases growth compared with where we are now, but that also manages to narrow the performance gaps between regions in the North. If the general pattern of benefits posited by the Steers Davies Gleave work for the Northern Way is correct, it may be possible to achieve increased growth and a reduction in inequality within the northern regions using a carefully targeted package of transport interventions; it is not necessary to go for 'growth at all costs' and ignore the distributional consequences.

It should be stressed that only preliminary conclusions are possible given the current evidence base, as the Steers Davies Gleave model is not a full cost-benefit analysis – it only considers the agglomeration benefits accruing to transport investment. Also, due to data limitations the benefits are modelled in fairly generic terms as a 'blanket' percentage reduction in travel costs within and across city-regions, rather than linking investments in specific routes to reductions in travel times on those routes (and reductions in congestion on alternative routes)[13].

Transport in the Regional Economic Strategies and City Region Development Plans

The Regional Economic Strategies published by the three northern RDAs in 2005-6 and the City Region Development Plans (CRDPs) published by the eight northern city-regions at around the same time propose a number of types of transport infrastructure investment[14]. These include:

- **Ports investment** – increasing capacity (for example Liverpool, Teesport); better rail access (for example Immingham), better road links.
- **Airport expansion** – broadly as outlined in the DfT's 2003 White Paper *The Future of Air Travel*.
- **Road infrastructure** – new road bridges (for example Liverpool, Newcastle); motorway widening and trunk road widening and dualling; village bypasses; new and/or upgraded road links to ports and airports.
- **Rail infrastructure** – upgrades to Trans-Pennine rail services; better rail links between Leeds and Sheffield; add-ons to the existing rail network (for example new rail loops, junctions and expanded interchanges); reopening of disused passenger rail lines (for example Bootle branch line in Liverpool); electrification of branch lines; main line improvements (especially East Coast

12. Additional modelling work commissioned from Steers Davies Gleave by the Centre for Cities (then at ippr) reaches the same conclusion, specifically with regard to investments in the Leeds city-region area. Once again, only the benefits to transport investments are modelled, and not the costs (Marshall and Webber 2007).
13. None of this should be taken as belittling the Steers Davies Gleave modelling work, which represents the 'state of the art' in agglomeration modelling in 2007; comparable recent models such as MVA *et al* (2006) suffer from similar limitations.
14. For full details of projects see: the relevant RES documents: North West Development Agency (2006), One NorthEast (2006) and Yorkshire Forward (2006); and the relevant CRDPs: Central Lancashire City Region (2005), Hull and Humber Ports City Region (2005), Leeds City Region (2005a, 2005b); Liverpool City Region (2005); Manchester City Region (2005), Sheffield City Region (2005), Tees Valley City Region (2005), Tyne and Wear City Region (2005).

Main Line to Newcastle, Tees Valley and Leeds, and Midland Main Line to Sheffield); new and expanded rail freight terminals.

- Trams, tram-trains and light rail – support for several new schemes (for example Merseytram (Liverpool), Tees Valley sub-regional transit, East Lancashire Rapid Transit, Leeds Supertram). However it should be noted that no new tram schemes have been approved in England by the Secretary of State for Transport since the Nottingham Express Transit opened in 2004. Merseytram and the Leeds Supertram were cancelled in late 2005.

The CRDPs also discuss the following related aspects of transport policy:

- **Scheme financing** – mainly this is based on combinations of Highways Agency funding, the Regional Funding Allocations established by the Government's Spending Reviews and bids for the Transport Innovation Fund (TIF), a new source of funding from DfT for schemes to tackle congestion and improve productivity. Funds are allocated to local authorities via a competitive bidding process. The fund is forecast to grow from £290m in 2008/09 to around £2.5 billion by 2014/15 (DfT 2006). However, in many cases the existing funding identified in the CRDPs is not sufficient to pay for all the schemes listed by the city-regions (for example, Leeds city-region identifies £2.7 billion of possible funding for its investment plan but this still leaves a funding gap of £1.8 billion [Leeds City Region 2005b]).
- **Fares policy** – particularly the use of discounted smartcard systems for public transport in northern city-regions.

In general the objectives of the transport plans set out in the CRDPs and Regional Economic Strategies are a good fit with the economic framework we have set out in this report, but there are two major weaknesses. First, the transport plans listed by the RDAs and city-regions are not achievable in full given the level of funding that is likely to be made available from the Highways Agency, Regional Funding Agreements, and TIF, and the Government's plans as set out in the 2007 Rail White Paper and the 2007 Comprehensive Spending Review. This leads to a danger that time and effort will be wasted in planning transport schemes which stand little chance of becoming a reality, which in turn can lead to public and business cynicism about the effectiveness of city-regions' and RDAs' strategic transport planning. As Marshall (2007) points out, it would probably be better to prioritise the most pressing schemes rather than having a blanket list of desirable projects. Second, as with central government, the environmental implications of transport policy are not considered alongside the economic growth case for transport investment; this is particularly the case regarding regional airport expansion, for example.

Future transport investments for the North

This section looks at the key decisions that will have to be taken in the next decade and beyond regarding the amount of investment in the North's transport infrastructure, and what form those investments should take. We analyse rail, air and road transport. The final subsection looks at the case for introducing a new spatial planning framework to allow a cross-cutting approach to northern transport investment.

Upgrading rail links

It is widely recognised that the main rail links between the North and South are not likely to be adequate to allow sustainable growth over the coming decades. As the Northern Way's latest transport report puts it:

> 'The North is physically well connected by rail, but what is apparent is that this network cannot deliver the level of service required to accommodate the demand that a resurgent Northern economy would generate.' (Northern Way 2007b: 8. For similar assessments see One NorthEast 2006, Yorkshire Forward 2006, North West Development Agency 2006, HMT/DfT 2006)

While the West Coast Main Line between London and Manchester has recently been upgraded to 200 kilometres per hour specification, and the East Coast Main Line runs at similar speeds, the Midland Main Line between London and Sheffield is much slower: the standard journey time between London

and Sheffield is around two-and-a-half hours, whereas London to Manchester takes only two-and-a-quarter hours, despite the fact that Manchester is further from London than is Sheffield.

Additionally, there is a wide consensus that, notwithstanding the improvements that have come from the introduction of new rolling stock to the Trans Pennine Express franchise, the main rail links *within* the North – particularly on the trans-Pennine corridor between the North East and Yorkshire and the North West, and the lines between Liverpool and Central Manchester and Leeds and Sheffield – are not yet fit for purpose. This was a strong finding which emerged from stakeholder seminars run in Liverpool and Newcastle at the end of 2006 by the Centre for Cities (when it was based within ippr) as part of its City Transport workstream (Marshall and Harrison 2007).

Failure to invest in upgrading rail links within the North and from the North to the South over the next decade is likely to have the following consequences:

- Increased congestion at 'pinch points' on the network and on key commuter routes into the North's major cities
- Decreasing levels of public satisfaction with the service being provided by northern rail companies
- An increase in growth of domestic air traffic between the North and other UK destinations (particularly London), with serious consequences for greenhouse gas emissions (see the section on air travel below)
- Increased use of, and congestion on, the major roads between London and the North, and between major northern conurbations.

In general, the UK is lagging behind considerably in terms of new and fast railway connections. Out of a total 76,300 million passenger kilometres made by high-speed railway within the EU, only 440 million (around 0.6 per cent) are within the UK. Two EU countries – France and Germany – are responsible for four-fifths of all high-speed railway passenger flows. A further 17 per cent can be attributed to just three other European countries (Italy, Spain and Sweden). The UK would clearly need to invest heavily in high-speed railway infrastructure if it wanted to catch up with the other 'big' EU countries and to be integrated into pan-European railway links (for example via Eurostar), although the UK's geographic location and island status and the specifics of its spatial development affect the dynamics of such infrastructure projects.

There is a strong case for major investment in improving rail links between the North and South and between city-regions in the North, but there is a key question over what type of upgrades to invest in. There are three alternative strategies:

1. Improving conventional rail links

This investment strategy would focus on upgrading and expanding the existing routes within the North and from the North to the South. It would include a mixture of interventions, for example:

- Building extra tracks at 'pinch points' to reduce line congestion and eliminate conflicts between commuter services, long distance services and rail freight
- Improving track quality to enable faster services to be run on some long-distance routes (as has already been done on the West Coast Main Line)
- Lengthening station platforms to allow larger capacity rolling stock to be used
- Introduction of new signalling to allow trains to run at higher speeds and at closer intervals.

This strategy would focus on upgrading and improving existing rail routes rather than requiring completely new routes to be constructed, and hence can be achieved incrementally rather than via a very large-scale up-front investment. (However, just because the investment is incremental does not necessarily mean it is cheap. For example, the most recent estimates suggest that the final cost of the West Coast Main Line upgrade will be in the region of £10 billion.)

2. High speed rail

This strategy would focus on the construction of one or more high speed rail (HSR) lines between London and the North, using technology similar to the St Pancras-Folkestone Eurostar high-speed line, which opened in November 2007, and the French TGV. With current technology, HSR systems are capable of operating at line speeds of up to 300 kilometres per hour (compared with 200 km/h on the current East and West Coast Main Lines, and around 170 km/h on the Midland Main line). Under the preferred option outlined in a scoping study on HSR for the Strategic Rail Authority by a consortium including Atkins and Ernst & Young (Atkins 2004), this would reduce typical journey times from London to Manchester from 130 minutes to 80 minutes, and from London to Newcastle from 180 minutes to 120 minutes. The preferred option in the Atkins study ('option 8') was for a line running from London to Birmingham on the approximate route of the existing West Coast Main Line, which would then branch into two sections. The western section would continue to Manchester and the eastern branch would serve the East Midlands, Yorkshire, the North East and Scotland. Other options that have been discussed include running the line from London to Yorkshire directly instead of through the West Midlands, and a high-speed east-west 'box' linking Liverpool and Manchester, South and West Yorkshire, Newcastle and Carlisle.

3. 'Maglev'

'Maglev' is an electromagnetic system with a train running on a 'guideway' without wheels or rails. Only one system in commercial operation has been built so far, in Shanghai in China. The maximum cruising speed for the Shanghai Maglev system is 500 km/h. The UK Ultraspeed group has proposed a maglev route running from London on a route approximately that of the West Coast Main Line, via Birmingham and Manchester, across the Pennines to Leeds, northwards to Newcastle via Teesside and then on to Edinburgh and Glasgow (UK Ultraspeed 2007). Ultraspeed suggests this would reduce the journey time from London to Manchester to 50 minutes and the London-Newcastle journey time to 1 hour 40 minutes.

The choice between the three options of improved conventional links, HSR and Maglev comes down to a range of factors:

Cost: Upgrades to the conventional network are easily scalable according to the available investment resources. Also they can be directed so that the parts of the network that are in greatest need of intervention – where the benefit-cost ratios from intervention are highest – can be tackled first (as mentioned by the Eddington Transport Study). Both HSR and Maglev would require substantial upfront investment: Atkins (2004) estimated £33 billion for the preferred North-South HSR option. As yet, no independent assessment of the overall investment required for Maglev has been undertaken, but it is likely to be substantially higher than the HSR estimate due to the need to build a completely new transport network and the novelty of the technology being used. The Government's recent Rail White Paper states that the costs of the Shanghai Maglev link were estimated to be around three times the cost of an HSR link over the same distance[15]. If this is the case then we would expect the cost of a UK Maglev network to be in the region of £100 billion – a cost that would almost certainly outweigh any additional economic benefits over HSR or conventional rail upgrades.

Business benefits: These can be calculated with a greater degree of certainty for upgrades to the conventional rail network and for HSR than for Maglev, as it is easier to predict how transport patterns will change in response to incremental investments than in the case of 'step-change' investments. However, the business benefits from HSR and/or Maglev are potentially bigger because they offer reduced journey times compared with conventional upgrades. Stakeholders in the discussions of regional transport organised by the Centre for Cities in Newcastle and Liverpool were, in general, more in favour of conventional rail investments than Maglev or HSR (although there was some mixed opinion in Newcastle, where current transport arrangements were viewed by some stakeholders as emphasising the region's peripherality and putting it at a disadvantage [Marshall and Harrison 2007]).

15. Unfortunately no attribution or reference is given in DfT (2007a) for this calculation.

The ratio of economic costs to benefits: The appraisal of HSR by Atkins (2004) estimated the benefit-cost ratio to be around 2 to 1 (so each £1 invested would produce £2 of returns), which is lower than many 'incremental' transport investments (HMT/DfT 2006). However, wider economic benefits such as agglomeration externalities are not included in the Atkins analysis. In line with the work on investment across city-regions in the North carried out for the Northern Way (Steer Davies Gleave 2006a), it is likely that there would be an uplift to GVA in the northern economy from a new HSR or Maglev link, especially as some of the largest proportionate decreases in journey times compared with standard rail are between the cities on the 'Northern Way' portion of the route – Manchester, Leeds and London. Additionally, the link would greatly reduce travel times between the North and London, which is also likely to result in cross-city-region agglomeration benefits. However, this cuts both ways; there is also potential for a fast link between London and the North to draw economic activity away from the North as well as towards it. For example, a 50-minute journey to London would put Manchester well within the London commuter belt – which could result in a big increase in the number of people commuting from the North West to London.

Environmental impacts: There are two main environmental impacts – the impact of additional infrastructure building on the countryside and landscape and on the townscape and urban environment, and the impacts from carbon emissions. The overall aesthetic impact of conventional upgrades on the countryside and the urban landscape is fairly minimal, although the introduction of additional track space and stations into crowded urban environments is often difficult because of the lack of space available for new infrastructure in cities, where space is at a premium. HSR infrastructure has an adverse environmental impact because of the need to construct large sections of new track. And in the case of Maglev, which is effectively an entirely new mode of transport with no compatibility with existing networks, the proposals from UK Ultraspeed are for structures that are mostly elevated above ground level. As for emissions, HSR has higher emissions than conventional rail but still produces lower emissions than domestic flights, per passenger kilometre. Maglev produces very few emissions in use, but its overall carbon footprint depends on how the electricity used to power the system is generated.

Modal shift potential: The calculations by Atkins (2004) show a lot of displacement from the conventional rail network and the road network onto HSR, with consequent reductions in congestion on these networks. The potential for modal shift from air to HSR or Maglev is significant but subject to the physical limitations of any system that runs on fixed tracks between a sequence of destinations – say from London to Glasgow via Birmingham, Manchester and Newcastle. To the extent that these cities do not lie on a straight line there is always going to be some redundancy involved in travelling from London to Glasgow via all the intermediate destinations on a high-speed surface transport, whereas a plane can just go directly from London to Glasgow.

However, HSR has the advantage that it can take you directly to the city centre, whereas most airports are some way outside. Maglev times in particular would be fast enough to represent a significant improvement relative to air on some of the key routes between central London and northern city centres, especially factoring in check-in times. Inevitably, even if an HSR or Maglev solution is adopted, there will also have to be investment in conventional rail 'spoke' links to travel from smaller towns and areas not on the main route so that the system can work effectively and attract custom from travellers based in smaller and more remote towns and cities. In addition, it will be more difficult for a Maglev system to penetrate city centres than HSR because HSR can share the existing rail network with conventional rail services within cities, whereas Maglev requires a totally new set of infrastructure – which may be difficult to provide because of the lack of space available. To the extent that Maglev stations have to be located outside of city centres this will be a disadvantage for travellers who want to get into the city centre. Finally, the level at which fares are set will be a crucial issue for HSR or Maglev, particularly in terms of attracting people away from other transport modes.

Safety and reliability: This is a key issue with Maglev – several key members of the development team were killed in an accident in Germany during testing in September 2006. The technology is relatively new and with only one commercially operational system in the world at the time of writing, there is little empirical evidence available yet on how durable it is in practice. Safety is far less of an issue with conventional rail and HSR as these are tried and tested technologies.

Rail links: conclusions

Given these issues, our recommendation is that a detailed appraisal is undertaken of the relative costs and benefits of the case for the three options for upgrading North-South rail links, and the options for links within the North – conventional upgrades versus high speed rail versus Maglev. The evaluation should use an upgraded NATA framework enhanced to take account of environmental and distributional costs and benefits, and should consider costs and benefits up to a time horizon of at least 60 years, in line with current appraisal guidance. It is important that the same evaluation criteria are used across the three options to create a level playing field. A number of HSR/Maglev options could be considered within the basic framework to 'fine-tune' the evaluation.

The Government should then invest as necessary in the option with the highest benefit-to-cost ratio. This may require additional government borrowing – which would, however, be justifiable under the Treasury's 'Golden Rule' for public spending, which allows borrowing to invest (up to the 40 per cent debt-to-GDP ratio specified by the Sustainable Investment Rule). Alternatively, a private financing package along the lines of the Private Finance Initiative, which is used extensively for investment in hospitals and other public sector capital projects, could be considered. However, the experience of the protracted attempts to secure funding for the Crossrail project in London suggests that a substantial proportion of Government funding will be necessary to get a high-speed rail or Maglev link off the ground (if one of those is the preferred option).

The Government's recent Rail White Paper (DfT 2007a) appears to pour cold water on the case for HSR in the short run (up to 2012 when the next 'High Level Output Specification' – a review of priorities for the network as a whole – will take place). The White Paper states that 'the Government's priority is to increase capacity. Prioritising [reduced journey times] would divert resources from the real priority of improving capacity and reliability' (DfT 2007a: 62). What this statement seems to ignore is that the laying of new HSR track, at least in the guise assessed by Atkins, *would* free up substantial capacity on the existing rail network for local, regional and freight rail services that currently have to share track with longer distance inter-city trains.

The White Paper is also dismissive of Maglev, on similar grounds to Eddington – because of its high cost and the uncertainty over the safety and long-term reliability of the technology. However, the Government does accept the possibility that new rail lines may be needed in the UK in the longer term, subject to 'a proper multi-modal assessment of the passenger and freight demand on each inter-urban corridor'. This seems sensible and in line with our proposal for a three-way appraisal of the North-South link options discussed above. However, we would argue that such an assessment should begin as soon as possible rather than delaying until 2012 or beyond. This is particularly important given the long lead times that would be involved in the construction of an HSR North-South link, and the even longer time that Maglev construction would take.

Airport expansion

There is a clear danger of fundamental conflict between the plans for airport expansion outlined in the 2003 *Future of Air Transport* White Paper (DfT 2003) and the climate change targets to which the Government is committed in its draft Climate Change Bill. The Government is likely to commit to reducing greenhouse gas emissions by at least 60 per cent by 2050 relative to current levels; furthermore, it is coming under increasing pressure to upgrade that target to 80 per cent. Recent work for ippr suggests that even an 80 per cent cut, combined with parallel measures in other industrialised and industrialising countries, may be insufficient to prevent the rise in average global temperatures from exceeding an increase of 2ºC above pre-industrial levels; that research recommends a 90 per cent cut (Baer with Mastandrea 2006).

In Section 1 of this report we pointed out that the Government regularly sends out mixed messages on climate change and aviation. On one hand, airport expansion all over the UK is seen as essential for promoting growth in the economy. But at the same time, the aviation sector is a fast-growing contributor to greenhouse gas emissions. Hence the Government is setting tough long-run emissions targets on one hand, and encouraging huge increases in emissions from air travel on the other. In response, Government ministers have emphasised that what matters is the

overall emissions target, and it is quite possible for emissions from the aviation sector to increase rapidly as long as emissions *fall* rapidly in other sectors.

However, emissions from aviation already account for 5 per cent of total carbon emissions in the present day (Lockwood *et al* 2007) and air passenger traffic is predicted to almost double between now and 2020. If air traffic continued to expand at this rate – doubling every 15 years – and the amount of greenhouse gases emitted per passenger were to stay constant, then by 2050 it would be approximately *eight times* the current level. Of course, if air travel were to become more technologically efficient, so that one could fly the same distance as now in 2050 but with a lower level of emissions, then the increase in emissions would not be so drastic. However, relying on new technologies to provide a drastic 'techno-fix' is a gamble, given that it does not seem that low-carbon aviation technologies will become a reality any time soon (Lockwood *et al* 2007).

Even if the Government were to commit to a target of 60 per cent reductions in carbon emissions by 2050 – which is probably far too low to be effective in limiting dangerous climate change – the increase in emissions from an eightfold increase in air traffic, given current emissions technologies, would use up the UK's entire 2050 emissions target, leaving no room for *any* other emissions from the entire UK economy. Clearly this would make a nonsense of the target. Even a doubling of air traffic up to 2020, followed by no further growth for the next 30 years to 2050, would make a target of 80 per cent reductions in carbon emissions by 2050 difficult to achieve as the rest of the economy would have to reduce its emissions by a factor of almost ten to achieve the target.

It is therefore clear that in the long term (up to the mid-21st century), the Government's airport expansion and climate change strategies are incompatible, unless technological advances enabling low-emissions flight can 'square the circle'. As we agree with the conclusions of the Stern Review that 'the scientific evidence that climate change is a serious and urgent issue is now compelling [and] warrants strong action to reduce greenhouse gas emissions around the world', we recommend that the Government rethinks its long-run airport expansion strategy to make it consistent with the 2050 target set in the Climate Change Bill that is currently passing through Parliament. Certainly there can be some airport expansion without jeopardising the emissions target – but only a limited amount. Plans for regional airport expansion therefore need to fit within a pattern that is consistent with meeting the emissions target. Complimentary policies to increase the cost of flying so that it better reflects the environmental costs of the emissions produced by planes, such as phased increases in air passenger duty and the planned entry of airlines into Phase 2 of the EU Emissions Trading Scheme, also have a key role to play.

Within the overall limits for expansion mandated by climate change policy, the following priorities for regional airport investment and management are important:

- The links between the rail network and many of the northern airports need to be improved. Of the North's airports only Manchester is directly connected to the main line rail network. In the short term, bus feeder links from most of the other northern airports need to be improved. In the long term the possibility of direct connection to the rail network or to alternatives such as light rail schemes (where these exist or there are plans to create them) should be investigated more thoroughly.
- The Government should consider using the planning system to favour expansion of regional airports, including those in the North, to handle a higher proportion of international flights, instead of some of the expansion that is scheduled to take place at the London airports (particularly Stansted). This would open up a wider range of destinations to residents in the North that they could access by travel to the local airport rather than having to fly, take the train or drive south to take an international flight from Heathrow, Gatwick, Stansted or Luton. It may also reduce the emissions associated with keeping aircraft in lengthy holding patterns before landing due to congestion at the London airports.

Travel by road in the North

Despite our focus on the need to improve public transport links in the North and the importance of containing the expansion of aviation within the limits of environmental sustainability, road transport is still by far the dominant mode of transport in the UK, and so it is important to consider what the priorities should be for road investment and transport policy in the North.

In our view there should be two main policy objectives for northern roads and motoring.

First, decisions to make new infrastructure investments in road transport – whether completely new sections of road, or upgrades to existing sections such as road widening or constructing dual carriageways – should be subject to the same appraisal criteria as for other transport investment projects. Some of the schemes mentioned in the Northern Way's *Strategic Direction for Transport* document (Northern Way 2007a) and the City Region Development Plans would almost certainly have a high benefit-to-cost ratio under an Eddington-style value-for-money assessment, even including their environmental costs. For example, road upgrades to reduce chronic congestion in urban areas and on key inter-city road links (such as the M62 and several sections of the A1) would fall into this category.

Second, as argued by Bird and Morris (2006) and by successive Secretaries of State for Transport from Alistair Darling onwards, there is a very strong case for introducing a national road user charging (RUC) policy to 'get the price right' (as the Eddington Transport Study puts it) on roads. Figures produced by DfT (2006h) as a research annex to the Eddington Transport Study, based on simulation evidence of the costs of congestion in the economy in the future, suggest that if the UK does not introduce a national road pricing scheme by 2015, there will be an economic case for additional road investment of between 2900 and 3350 additional kilometres of road network between 2015 and 2025, to alleviate the additional congestion expected by 2025. The cost of building these extra roads is estimated at around £30 billion in current prices. However, if a national RUC policy is introduced, the same estimates suggest that only 500 to 800 kilometres would be needed to achieve the same congestion levels.[17] The same study estimates that the monetised benefits of a national RUC scheme could be as much as £28 billion per year by 2025.

If these estimates are even roughly accurate then the potential gains from a national RUC scheme are extensive; but currently large sections of the public are hostile to road user charging[18] and this is a major barrier to the introduction of a scheme, and even to the serious discussion of proposals by politicians of any major party.

Spatial planning

The absence of a national spatial framework for the UK in general, and for England in particular, causes serious problems for the coherent and sustainable development of the country. This leads to a situation where government cannot perform adequate planning and implementation functions for (the majority of) policies that have spatial implications. This in its turn leads to imbalances in infrastructure provision, the development of urban cores, the provision of housing, business sites and public amenities. The need to address this problem was mentioned in both the Barker and Eddington reviews.

It is important to have a long-term national framework for spatial planning not only to address the existing imbalances between urban and rural areas, industrial zones and natural reserves, the overheated South and the underdeveloped North, but also to respond to new challenges, prompted by more prominent environmental concerns, much greater migration flows, financial and trade flows, technological progress, changing work patterns and life styles, and so on. European countries have also realised the importance of a coherent EU-wide approach to spatial planning. It is impossible for the

17. The estimated amount of congestion in 2025 if a national RUC scheme is introduced would of course depend on how much road users were being charged to drive on particular roads. For more details see DfT (2006h).

18. Experience from campaigns for local RUC are salutary here. The experience of the London congestion charge shows that it is possible to turn around public opposition once the scheme is up and running. On the other hand, the defeat of proposals to introduce a congestion charging scheme in Edinburgh in 2005 shows that public opposition can, in some cases, be intense enough to stop a scheme from getting off the ground.

single market to function effectively and to implement pan-European transport and energy projects successfully without cross-country collaboration and the existence of a universally approved framework.

Thus, in 1999 EU countries agreed on a European Spatial Development Perspective (ESDP), a non-compulsory framework for coordinating national spatial development strategies at the supra-national level. Although the UK has not yet responded to this call and has not yet prepared a national spatial strategy, three of its nations – Northern Ireland, Wales and Scotland – have prepared their own spatial development plans/strategies.

Moreover, after the enactment of the Planning and Compulsory Purchase Act in 2004, each of the nine English regions has recently prepared a Regional Spatial Strategy (previously known as a Regional Planning Guidance; and in the near future it will be merged with Regional Economic Strategies to form a Single Regional Strategy). This is a very positive move; however, it suffers from the drawback that the strategies are not linked to a single national planning document. It is thus essential for England to prepare and agree a national spatial development plan (and to coordinate it with the existing Welsh, Northern Irish and Scottish plans) in the near future. This plan would become an integral part of the process for rationalising the use of space in order to achieve sustainable development targets while improving economic performance.

There are several good examples of a possible evidence base that could be used to prepare such a strategy. One of the best is the 2006 report by the Royal Town Planning Institute *Uniting Britain*, which provides a comprehensive evidence base for a future spatial planning framework (RTPI 2006).

Implications for the North

If the North of England wants to get the most benefit from its spatial planning, it should coordinate (maybe via the Northern Way) the development of the North's three Regional Spatial Strategies, or Single Regional Strategies as they become soon. In order to change the perception of the region (especially the North East and North West) as a distant periphery, the regions should take a fresh look at its territorial location – between Scotland and the South, and edging onto the Baltic/Nordic region. Effective use of the new initiatives, such as the EU 'sea highways' policy, is strategically important for capitalising on the location of the North. Planning further transport infrastructure in this context would help to tap into new economic opportunities arising as the result of the changing political context (with stronger autonomy in Scotland), technological progress and new social trends (increased immigration, for example).

One suggestion from the Eddington Transport Study that we are sceptical about is the proposal for an independent planning commission that would grant or refuse planning permission for major transport infrastructure projects. This tallies with a suggestion from the Barker Review of Land Use Planning for a similar body to make planning decisions more generally (HMT/DfT 2006, Barker 2006). As work by the Centre for Cities points out, handing major planning decisions on use of land for transport or other purposes to a nationally appointed commission risks making those decisions too remote from local communities and regional priorities (Marshall 2007, Nathan 2007). Barker argues that major planning decisions need to be taken at the national level because the decision, for example of whether to approve a new airport runway or port terminal, often has national spillover effects too. But such decisions also have *regional* and *local* spillover effects, and we argue that planning policy should be about balancing these against each other rather than letting national considerations override everything else.

The regional or pan-regional level would seem to be a sensible 'bridge' level between national interests on the one hand and local interests on the other. Thus we believe planning decisions in the North should be taken at the regional, or pan-regional level. The RDAs and Northern Way should play an important role in this.

Transport governance and management

Arrangements for transport management and governance have recently received criticism in the North, as elsewhere. The Eddington Transport Study (HMT/DfT 2006) found the following problems with sub-national decision-making in transport:

- The current framework for decision-making is highly complex, with a number of different structures and organisations and a large number of players.
- The boundaries for transport governance do not match functional economic areas for the most part.
- The responsibilities for different policy levers (for example road planning, traffic management, bus regulation, rail investment, fares policy) are often split across different bodies.
- Current funding streams for transport investment do not incentivise effective decision-making.
- Partnership working between different bodies is often a stop-gap measure to overcome functional splits in responsibility rather than something that is decided on an optimal basis.
- There is a lack of regional strategic oversight on the transport system – the current governance frameworks focus on either national or local concerns.

The current arrangements for transport governance in the UK's localities and regions are the result of many decades of incremental changes and reforms to the way the UK's transport system is run which may have made sense within themselves at the time, but the overall outcome is that the governance system is failing on many levels. The Government has recognised many of these issues, and its Local Transport Bill, currently going through Parliament, addresses some of them. We will refer to the provisions of the bill at many points throughout this section.

We begin by looking specifically at urban transport governance within the major city-regions, and then go on to look at arrangements for local transport outside city-regions. Finally, we consider regional and pan-regional transport governance.

City-regional transport governance in the North: the PTA/PTE model

Five of the eight city-regions in the North (West Yorkshire, South Yorkshire, Tyne and Wear, Greater Manchester and Merseyside) use the Passenger Transport Authority/Passenger Transport Executive (PTA/PTE) model for public transport governance.

The PTEs have the following responsibilities:

- Producing strategies for the development of local public transport networks
- Managing and planning local rail services in partnership with the Department for Transport
- Planning and funding 'socially necessary' bus routes
- Working in partnership with bus operators to improve services
- Running concessionary fare schemes for public transport
- Investing in local public transport networks (to the extent that this is possible with current funding arrangements, which are limited)
- Developing and promoting new public transport schemes (although the PTEs do not have the final say on whether these should go ahead)
- Managing bus stations within the city-regional area
- In some cases, operating public transport directly (for example the Tyne and Wear Metro).

This set of powers is wide but limited, and is lacking in some crucial areas. For example, the PTEs do not have control over highways or roads policy within the city-regions. The location of urban bus lanes is still decided by local authorities within PTE regions, not by the PTE. Also, PTEs cannot exert significant influence over bus timetables, routes and fares without making an application to the DfT to secure 'Quality Contract' status. As pointed out in the recent DfT Buses White Paper (DfT 2006c), it is currently very difficult to secure Quality Contract status because the PTE needs to prove that it is the

'only practicable way' to achieve its aims for bus policy – which is very difficult. The amount of influence which PTEs have over urban rail services was always slim, and has decreased since DfT took over rail strategy after the dissolution of the Strategic Rail Authority in 2005 – PTEs are no longer signatories on new rail franchise agreements in their areas. And the current funding options open to PTEs to secure transport investment are very limited.

Meanwhile, Passenger Transport Authorities are made up of councillors from the local authorities within the PTE area and provide oversight to the PTE's activities. However, due to the limited powers enjoyed by PTEs, there is limited incentive for councillors to get involved in any detail, and the quality of oversight is generally not as good as it could be. These issues were recognised in the Eddington Transport Study and a recent report on city-regional transport arrangements by the Commission for Integrated Transport (CfIT 2007). CfIT recommended the creation of 'strategic transport authorities' with a much wider set of powers in the city-regions, including:

- Managing and maintaining the road network, traffic management and parking regulation
- Managing traffic demand through roadspace prioritisation and highways development control
- Incentivising behaviour change towards sustainable travel modes (including public transport, cycling and walking)
- Planning, prioritising and delivering major transport infrastructure (including both road and public transport projects)
- Developing and implementing urban road user charging (RUC).

This is in line with Eddington's broader recommendation in this area that the Government should consider 'to what extent powers should be vested in a single decision-making body at the sub-national level, including … highways and traffic powers over local strategic roads, including road pricing; and powers for buses' (HMT/DfT 2006: 268).

The Government has responded to these ideas with provisions in the Local Transport Bill to promote major reform of the PTA/PTE system, including provisions to allow the Secretary of State for Transport to compel a review of the transport arrangements in a metropolitan area. There are also a number of new powers that city-regions will be allowed to exercise subject to approval by the Secretary of State (and by Parliament, as new secondary legislation will be required in each case):

- New powers for city-regions allowing them to reform their PTA governance arrangements if they so wish
- Giving city-regions the power to draw up new arrangements for the transfer of public transport, highways and traffic powers to PTEs
- Powers to create a PTA/PTE arrangement in city-regions that do not currently have such an arrangement
- Flexibility to change the powers of PTEs and geographical boundaries of PTEs at a later date if current arrangements prove sub-optimal.

The Local Transport Bill also contains details of new arrangements for the local management of bus services. There will be a new statutory duty on local authorities to promote good bus services, and stronger partnerships between PTEs and bus operators. Quality Contracts will be easier to secure; they will no longer have to be the 'only practicable' option for bus reform but can be used in a variety of circumstances, subject to a looser public interest test.

As recommended by the Commission for Integrated Transport, the Bill also introduces some changes that make it easier for local authorities to introduce urban road user charging (RUC) powers. The requirement for a public enquiry before RUC is introduced in a city is to be dropped, and new arrangements are to be put in place so that the revenues from RUC can be hypothecated to transport investment.

There is much to welcome in the Local Transport Bill. The new PTA/PTE framework allows the integration of public transport, highway and traffic powers in a manner that corrects many of the

deficiencies and irrationalities of current arrangements. The new powers for PTEs should also incentivise stronger and higher quality PTA leadership. The new arrangements for bus management would allow the bus industry to move away from the obssession with deregulation and competition at all costs (and regardless of the outcomes) that characterised the free market frenzy of the 1980s. At the same time they should allow the retention of deregulated arrangements in the cases in which they have been shown to deliver high quality outcomes.

Moreover, the integration of transport planning functions in the PTEs should allow for city-regional transport and inter-modal competition to be managed in a more rational manner, particularly when the transport system has been designed for complementarity between different modes rather than to be run as a free-for-all. The most obvious example of this is in Newcastle. The Metro rail system there was constructed in the 1970s to provide fast transport between the city centre and terminal interchanges with bus links on the outskirts of the city. But when deregulation occurred in the 1980s, the bus companies began to reduce the number of services running to and from the interchanges and instead to compete directly for business with the Metro by running buses into the city centre, with increased congestion and journey times and a decline in the overall coherence of the public transport system. The new arrangements for city-regional transport governance offer PTEs the flexibility to choose a regulated or deregulated approach to public transport planning depending on the particular features and idiosyncracies of the urban area in question.

Additionally, anything that can be done to make urban RUC easier to introduce is welcome: recent evidence from ippr on public attitudes toward road pricing (Bird and Morris 2006), coupled with the recent anti-road-pricing petition on the Downing Street website which attracted 1.8 million signatures, suggests that a national RUC scheme is still a remote prospect. Some northern cities are investigating local RUC, in particular Manchester and Newcastle. However, stakeholder feedback from the recent City Transport seminars run by the Centre for Cities (when at ippr) suggests that there will be significant resistance even to urban RUC (Marshall and Harrison 2007).

Need for further reform

Despite our positive appraisal of the plans in the Local Transport Bill, there are still several areas that need further reform to address the current deficiencies in the city-regional transport governance framework.

First, there is a question regarding how city-regions will finance new investment in transport schemes that PTAs and PTEs might want to introduce. The toolkit of current funding options is limited, and although new initiatives such as the Transport Innovation Fund (TIF) are very welcome, they will probably not be sufficient on their own. Marshall and Harrison (2007) suggest giving PTEs the power to levy a Supplementary Business Rate – a top-up of up to 4p on the national business rate – to help bridge funding gaps for key transport priorities. The Government's recent White Paper suggests a similar mechanism (CLG/HMT 2007) but the proposals are yet to be enshrined in legislation.

Second, there are questions over whether the pace of reform is sufficient. While the framework has been put in place to change each city-region's transport arrangements, the process of actually implementing the changes may be slow, as each city's arrangements will require secondary legislation. Likewise, agreeing Quality Contracts for bus services is still likely to be a drawn-out process, even after the reforms.

Third, the flip-side of the flexibility and devolution coin is that the existing inadequate set of powers means that city-regions in which the best arrangements for reform are less certain or disputed run the risk of being left behind other city-regions. Of course, this is always a risk of any reform that puts localities in the driving seat, and it would be counter-productive to put local authorities and city-regions in a managerial straitjacket because of the fear that some of them might not make the best of the new freedoms they are being granted. But it is important that the Government reviews the performance of each city-region under the new rules a few years on, so that underperforming PTEs can be identified and given advice and support to improve their performance.

The new arrangements allow city-regions in the North that do not currently have a PTA/PTE structure

to inaugurate one, and, as suggested in previous ippr north work by Palmer and Adams (2005), we recommend that a PTE be established in the Tees Valley city-region, as there is clear evidence that this would improve the prospects for public transport there.

Finally, in the specific case of rail network and franchise management we recommend that the recent decision by DfT to remove PTAs as signatories to rail franchise documents be reversed; this would be consistent with their expanded powers and is a key step towards integrating transport responsibilities across all urban modes. Within the commuter rail jurisdiction, DfT should also investigate the possibility of introducing a 'Quality Contracts' system for trains where commuter rail routes are felt to be providing a poor service at present. Under a rail Quality Contract PTAs/PTEs would have the power to regulate certain types of rail fares, and service frequencies, to promote certain socio-economic objectives – for example to ensure affordability of off-peak fares. The model of Transport for London's extension of control over London commuter rail, which is scheduled to happen in the next few years, is a useful guide here.

Other local transport arrangements (in urban areas outside city-regions and in rural areas)

Even if extra PTAs and PTEs are created in the northern city-regions that currently lack them, much of the northern population will continue to live outside the boundary of a PTA/PTE system. The Government needs to make sure that the areas *outside* city-regions are not left with significantly more dysfunctional transport arrangements than areas inside them.

Some of the provisions in the Local Transport Bill will apply equally to city and town councils and to rural local authorities as to PTEs – the new management framework for bus services, for example. And in some cases the powers being granted to PTEs are already in the hands of councils in non-city-region areas – control over the implementation of bus lanes, for instance. But the Government should check whether there are any instances in which it would be useful to give town and city councils the same kind of powers being granted to the PTAs and PTEs under the new legislation, and introduce arrangements to make these powers available to cities and towns outside city-regions if possible. A good example of this would be the additional RUC powers which the Transport Bill gives to PTEs in city-regions.

For rural areas in the North the situation is more complex. Congestion charging initiatives are not likely to make sense in these areas outside the framework of a national charging scheme, and these communities tend to rely much more on the car as a means of transport, with rail playing a minimal role. The new bus service provisions apply equally to rural local authorities as to urban transport authorities, and there are additional provisions in the Local Transport Bill to make it easier to establish community bus services, run by the community itself on a voluntary or social enterprise basis, to plug gaps in provision by bus companies. These initiatives are to be welcomed. Additionally, we support the recommendation of the Northern Way (Northern Way 2007a) for a pan-northern public transport smartcard system, which would allow people from rural areas in the North to make better use of public transport services in towns and cities.

Oversight of regional and pan-regional transport

The lack of coordination between sub-national transport decision-makers identified in the Eddington Study applies just as much to governance at the regional (and pan-regional) level as it does at the local level. Currently there is a split of responsibility between DfT (which negotiates passenger rail franchises and purchases infrastructure improvements from Network Rail), the Highways Agency (which manages the strategic road network), the Regional Assemblies (which produce regional transport strategies as part of their Regional Spatial Strategies – but will be disbanded by 2010) and the RDAs (which produce Regional Economic Strategies, to become Single Regional Strategies in 2010). Transport is one of the three key priorities identified by the Northern Way in its recent review of activities.

At a regional (or a pan-regional) level there needs to be clearer lines of communication and more liaison between the RDAs (working with the Northern Way) and the Highways Agency, the Office of Rail Regulation, Network Rail and rail operators, and airport and port operators as well as the DfT. We

do not propose any formal transfer of powers over transport policy to the RDAs as they were never designed to be delivery vehicles in this area of policy. Rather, they should have more *influence* over the direction of transport policy in the North, with a specific remit to make the case for better integration between different transport modes, and acting as a regional sounding board for transport investment proposals from the DfT, Network Rail, Highways Agency and airport and port operators that affect people in the North.

The RDAs and the Northern Way will be able to improve their prospects of exerting influence over future transport policy in the North if future Regional Economic Strategy documents and the Northern Way transport strategy prioritise projects that provide the best value for money for each pound invested by central government, PTAs, or local authorities. This should be done while taking into account economic growth effects, environmental impacts and distributional considerations, as explained in the economic framework developed in Section 2.

There can also be a key role for the northern RDAs and the Northern Way in the planning process for major infrastructure projects in the future, acting as a bridge between hopes regarding the impact of expansions to the transport system on local communities on the one hand, and national interests and priorities on the other.

4. Conclusions

It is clear from even a cursory examination of regional transport statistics that large quantities of investment, and significant reforms to governance arrangements will be required for the northern regions to have a transport system that is fit for the future. This is not a specific criticism of the North *per se*, as all regions in the UK (with the partial exception of London) are suffering from the same symptoms of transport policy failure: heavy reliance on the car as the main mode of personal travel, declining bus use, persistent underinvestment in rail infrastructure, growing traffic congestion and falling traffic speeds in urban centres. At the same time, the North faces particular problems: for example severe 'pinch points' on the road and rail networks, and a reliance on a Passenger Transport Executive/Authority model for the northern city-regions, which suffers from fundamental weaknesses.

So what needs to happen to revitalise the North's transport network? Clearly, major investment in the rail network, bus services and upgrades to the North's road network are crucial. But transport investments need to provide value for money, which is why we broadly welcome the recommendations of the Eddington Transport Study that new investments should always be based on a rigorous assessment of the costs and benefits of each investment option.

However, simply investing to maximise economic growth, will not be the best strategy. Transport investment decisions should take the distributional consequences of investments into account. And overridingly, all transport decisions need to be consistent with the UK's long-term carbon emissions targets in the forthcoming Climate Change Bill. This is particularly important as regards the DfT's plans for air expansion, which are not consistent with the targets unless aviation emissions fall sharply per passenger and/or there is a huge cut in emissions from the rest of the economy over the next four decades.

Crucially, Eddington's call for 'value for money' must *not* be interpreted as a call to cut back transport investment that has already been falling for most of the last 15 years as a share of GDP. Given the tight transport settlement that has emerged from the 2007 Comprehensive Spending Review, and the decision to fund the Crossrail scheme for London and the surrounding regions, there is a clear danger that large-scale transport investment in the North will be a casualty of the tight fiscal climate and the Government's other transport priorities. This would be a big setback for the North's hopes of improving its economic performance relative to the rest of the UK. The Government needs to revisit its regional transport funding allocations to ensure that the northern regions are getting their fair share of funding from the centre.

On transport governance, the Government's broad direction of travel in its Local Transport Bill is sensible and will go some way towards addressing the deficiencies of the current system – but by no means all the way. In particular, PTEs and PTAs will still be too weak in some crucial areas of transport governance to do the job of managing transport systems across their designated city-regions effectively, even after the Bill is passed. They need more powers to finance transport investment and more control over urban rail services. And reform needs to be faster paced and introduced in a more legislatively streamlined way. Additionally, greater powers need to be given to local authorities in smaller towns and cities that do not qualify for city-region status. Finally, there need to be better lines of communication between the northern RDAs and the agencies and companies responsible for managing the transport system at a national level.

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