DOES REDUCING JOURNEY TIMES IMPROVE THE ECONOMY – AND, IF NOT, WHAT ARE THE IMPLICATIONS FOR TRANSPORT ASSESSMENT?

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1. INTRODUCTION

Transport is mainly a service function – it is there to support the community and its economy. A transport system, or indeed a transport project, is 'measured' in terms of what it can do to facilitate the well-being of the community either indirectly in relation to its actual performance ('outputs') or directly in terms of its actual effects on that well-being ('outcomes'). Any changes in the status-quo of a transport system is generally measured in terms of its community costs and benefits – the theory of which stretches back to Jeremy Beetham in the eighteenth century – and which has been practically used for public administrative purposes since the water resources development in the 1930s in the USA.

It is generally accepted that an important output element in transport performance is the time taken to actually travel, which is normally taken to be wasted / unused. Therefore any reduction in travel time is normally seen as a gain / benefit and has, since Dupuit's paper of 1844[1], been described as a 'consumers' surplus' if valued at more than any expenditure by the consumer to achieve it. In contemporary transport cost / benefit appraisals the value of time savings provide over 85% of total use benefits within the Transport Economic Efficiency Analysis (TEE). However there always has been a counter argument against the need to reduce travel time, a nineteenth century anti-railway quotation from John Ruskin being:

'*Now, every fool in Buxton can be in Bakewell in half an hour, and every fool in Bakewell in Buxton; which you think a lucrative process of exchange – you Fools Everywhere.*'[2]

The measurement of community outcomes has until recently not been seen as either practical or realistic to forecast – despite an historical underlying assumption that transport development (whatever that means) does indeed help the economy (although this may be a localised effect possibly achieved by 'transfer' from elsewhere). These however now have a part to play in transport appraisal[3] and are defined as 'Wider Economic Benefits' (WEBs) and 'Economic Activity and Locational Impacts' (EALIs):

- 'Wider Economic Benefits' are intended to capture the '*additional wider benefits of improved transport provision to economic development*' (which are in addition to the '*economic impacts of a project (such as time benefits), expressed in terms of economic welfare'*); and

- 'Economic Activity and Locational Impacts' are concerned '*with the spatial distribution of these national impacts (TEE and WEBs) to allow an assessment of the impact on the local economy*'.

At present it has not proved possible to adequately monitor WEBs and therefore they are normally included in an appraisal as a sensitivity analysis on the TEE; while it is broadly assumed that EALIs will not identify additional economic impacts to TEE and WEBs, merely identifying the impacts on different areas.

So the quest for this paper is to examine whether there seems to be any obvious evidence for or against a positive macro correlation between changes in transport provision, travel times and economic activity – and therefore whether the basic assumptions in transport appraisal are secure. To deconstruct this further, the paper will attempt to answer the following questions:

- Is there a link between journey times, time spent travelling and economic growth and if there does appear to be some correlation, in what direction is the causality?

- What evidence is there that our investment in transport over the past 50 years has reduced the time that we spend travelling? If it has not, then what impacts has it had – and how is travel time used?

- How far does the available empirical evidence support the view that new surface transport infrastructure investment will help to increase GDP – both in terms of the immediate employment impact of the investment itself as a public works project, and then more widely, as a stimulus to general economic activity? Nested within this, to what extent can we be confident that the agglomeration productivity benefits that have become part of UK transport appraisal in the past few years will actually be realised?

- What are the wider implications of the preceding discussion for transport appraisal more generally and for policies that seek to reduce journey times to increase economic growth, in particular?

2. STRUCTURE OF THE PAPER

The paper is structured around the research questions set out above. The first research question is dealt with by reference to macroeconomic data on economic

growth and to national travel survey data on time spent travelling, and average travel speeds. The analysis seeks to uncover whether there is any link between the success of an economy and the time for or speed at which people travel – for example, whether economies grow faster when people are spending less time travelling and/or travelling faster.

The second research question again looks at national travel survey data to take a view on trends in time spent travelling, over time, to explore the argument that, if transport investment has been focused on travel time reduction then, ceterus paribus, overall time spent travelling should have reduced. This point will also be illustrated with reference to a case study from Australia. It will also be answered with reference to research on the use of time spent travelling, to show that in some circumstances a travel time reduction may be seen as a dis-benefit.

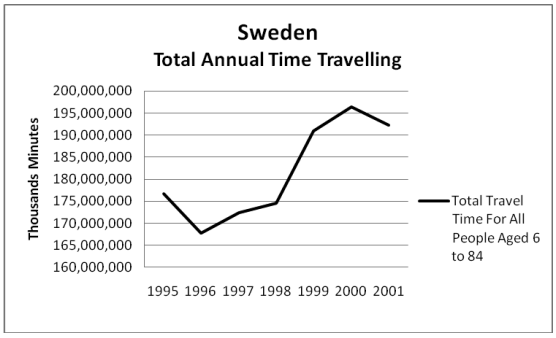
The third research question is one that has historically been particularly difficult to answer. This paper tries to address it by bringing together as much empirical evidence as possible on the impacts of transport investment on wider economic growth. It will also draw on research from Austria to consider the direct job creation impacts of new transport investment, per £ spent. Finally it will also question the direction of causality in the documented link between employment density and agglomeration economies, thus also questioning the confidence with which we can put a value on these in transport appraisal.

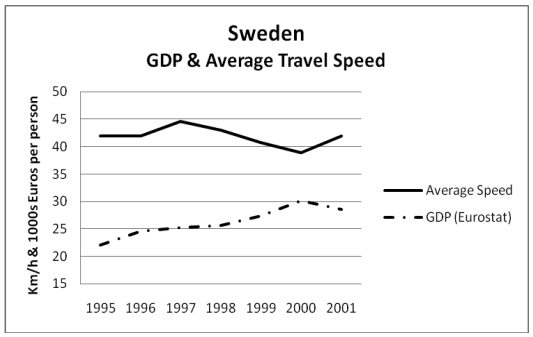
Finally, the paper will draw conclusions based on its findings and relate these to current priorities in Scottish transport investment.

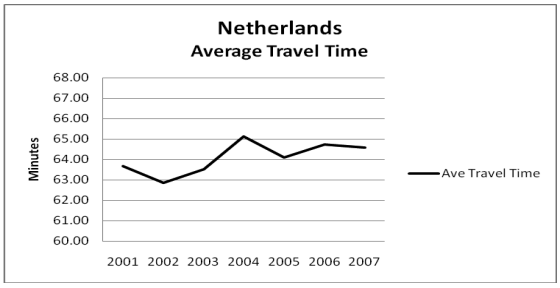
3. JOURNEY TIMES, TIME SPENT TRAVELLING AND ECONOMIC GROWTH

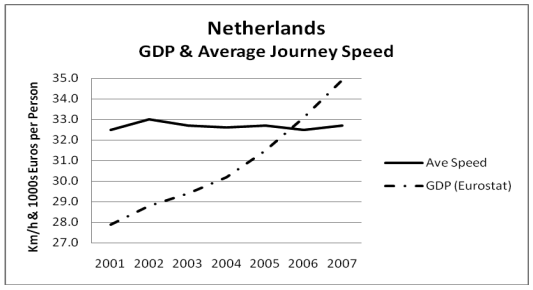
We will start by considering whether there is there a link between journey times, time spent travelling and economic growth and if there does appear to be some correlation, in what direction is the causality?

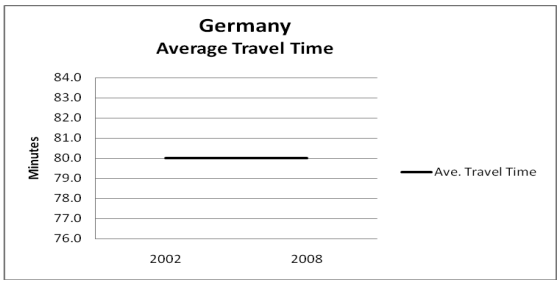
The following graphs based on data from Sweden[4], Germany[5], the Netherlands[6] and the UK show the time spent travelling and the average speed of the average trip made by private individuals (whether in work time, commuting or for other reasons) together with variations in GDP over the past few years (the period is different for different countries, due to variations in data gathering).

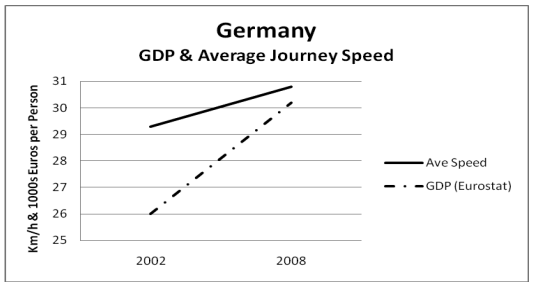


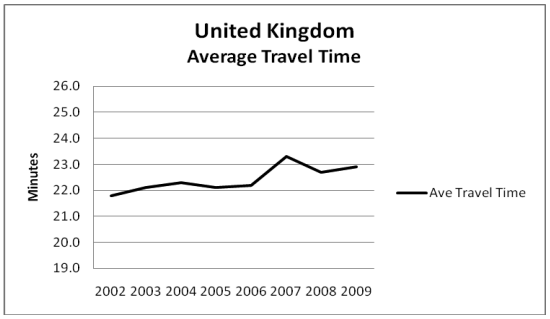


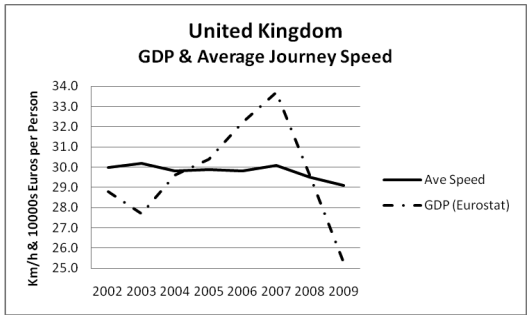












The conclusion that we can draw from this data is that if there is a link between journey times, time spent travelling and economic growth then it is extremely weak. The average speed of personal travel has remained remarkably constant, with the exception of the change in Germany between 2002 and 2008. At the same time, all these countries' economies have continued to grow at rates that show no correlation with changes in average speed.

4. TRANSPORT INVESTMENT AND TIME SPENT TRAVELLING

This section considers the question of what evidence there is that our investment in transport over the past 50 years has reduced the time that we spend travelling? If it has not, then what impacts has it had – and how is travel time used?

There has been debate over potential travel time savings from transport enhancements for some 40 years – despite an established and practised orthodoxy on the subject. In this section we have drawn on a report of a workshop hosted by the DfT in 2005[7] and a debate within 'Transport Reviews' in 2008[8]

4.1 Aggregate Travel Time

We have already noted the consistency in average travel time per trip in the UK over recent times in the previous section. The UK National Travel Survey (NTS) has however measured average daily travel time per person since 1972/73. This now amounts to just over 1 hour per day, but this has changed very little over the whole period (possibly marginally upwards). However car ownership has doubled and the average distance travelled increased by 60%.

Since the early-1970s there has been a considerable investment in transport enhancements across the UK (>£100 billion), with it would seem virtually no reductions in overall travel time (despite this being one of the main objectives for the investment) and indeed an increase in distance travelled.

Studies do show that there are time savings for vehicles with speedier journeys related to transport enhancements, but there seem to be a dearth of studies showing actual travel time savings for users. However this does not mean that travel time savings do not exist in possibly the short term in relation to specific enhancements, although it may be concluded that these overall in some way disappear over time. One empirical study of a new motorway in Melbourne, Australia, was presented by Odgers and Low at the World Conference on Transport Research 2010[9]. This actually showed that the time savings predicted to result from the construction of the road did not arise either on the corridor itself nor on the wider transport network in the city; in fact they decreased, to the extent that the forecast Benefit-Cost Ratio was seriously eroded.

So we must ask '*what has been achieved*' – does travelling further actually yield net economic, social and environmental (dis)benefits?

4.2 Travel Time 'Budgets'

It has been argued that people implicitly set themselves a personally acceptable travel time 'budget' and when travel enhancements are undertaken on 'their' travel route this does not actually reduce their travel time (except in the short term) but actually

widens the available opportunities (in the medium and long term) for everyone to travel a longer distance within their 'budgets'.

However there is a counter argument that this aggregation hides what individuals do, the interaction between individuals and overall network effects. But in the end virtually all transport planning relates to aggregation effects.

4.3 Use of Travel Time

As we noted in the introduction, travel is not generally undertaken for its own sake (except for some recreational purposes). Travel time may nevertheless be used in a variety of ways[10] (some depending on the mode being utilised) which can include:

- Driving;
- Thinking (work and / or personal);
- Work and / or social interaction;
- Using a 'phone (work and / or personal);
- Using a lap-top (work and / or personal);
- Reading (work and / or personal);
- Eating and drinking;
- Coping with the transition between the activities at each end of the journey; and
- Pure individual enjoyment.

While it is open to interpretation, many of the work-based (and other) uses may be defined as 'productive' working time and therefore this may not be time that needs to be saved. Indeed certain work-based uses may require a minimum length of time for achievement and reducing journey times could encroach on that productivity. In addition it can also be argued that there should be an absolute minimum length of journey time related to coping with 'transition' (20 minutes for 'commuting'?).

An important feature for the productive use of travel time is its dependability – if it is foreshortened or late it will disrupt the in-travel work processes and cause problems at the far terminal activity. It is more important to be dependable than excessively fast.

Depending on the balance of travel time use, even if there is only a marginally positive economic utility to travel time then what advantage is there to reducing the travel time of a particular journey by transport enhancements?

4.3 Greater Access Availability

If the amount of time used by each person in aggregate for travel is broadly constant, while actual travel times are decreasing, then by implication (and from evidence) people are actually travelling further. This means that there are a larger number of potential destinations available to people, within their travel time 'budgets' to meet their specific needs. 'Access' has therefore by default become the goal of transport enhancement.

Enhanced accessibility has changed the economic value of land-use and the economic benefits of transport enhancement have therefore tended to accrue in changes to wages, profits and land rents rather than to the actual travellers. This greater accessibility of the available facilities at any one place also has a multiplier effect related to their agglomeration benefits and thus enhancing the general economic vibrancy.

Conventional transport appraisal has argued that the monetised benefits of the time "savings" predicted to arise from transport investments are a reasonable proxy for the economic benefits of the greater accessibility that they actually in practice appear to generate. It has also been suggested that the time "savings" provide only a conservative estimate of the accessibility benefits and therefore underestimate the scale of induced traffic making use of the enhanced accessibility. However, Wenban-Smith[11] (2011) argues that time "savings" in fact greatly over-emphasise the actual economic development benefits of a scheme.

The generalised outcome of transport enhancement has however become a more accessible wider area - urban sprawl – but this is potentially available to only a portion of the population able to use this accessibility. This is possibly an unforeseen political consequence.

5. TRANSPORT INVESTMENT AND ECONOMIC GROWTH

This section of the paper considers the question of how far the available empirical evidence supports the view that new surface transport infrastructure investment will help to increase GDP – both in terms of the immediate employment impact of the investment itself as a public works project, and then more widely, as a stimulus to general economic activity? Nested within this, it also considers the extent to which can we be confident that the agglomeration productivity benefits that have become part of UK transport appraisal in the past few years can actually be realised.

SACTRA[12] in their report on the links between transport and economic growth stated (p 12) that

'*…we are provided with a strong theoretical expectation that all or part of a successfully achieved transport cost reduction may subsequently be converted into a*

range of different Transport and the economy wider economic impacts. This, in principle, provides for the possibility of improved economic performance. Empirical evidence of the scale and significance of such linkages is, however, weak and disputed. We conclude that the theoretical effects listed can exist in reality, but that none of them is guaranteed. Our studies underline the conclusion that generalisations about the effects of transport on the economy are subject to strong dependence on specific local circumstances and conditions.'

More recently, the Eddington Report[13] was commissioned by the UK Treasury. It states (Vol 1 p 3):

'Today, in mature economies like the UK, with well-established networks and where connectivity between economic centres is already in place, the evidence suggests that there is considerably less scope for transport improvements to deliver the periods of rapid growth seen historically.

Instead, the debate for such countries should be focused on the performance of the existing network, particularly where capacity is stretched, as demonstrated, for instance, through congestion or unreliability.'

Eddington therefore suggests that road and rail investments will generate the greatest economic benefits where they relieve congestion and unreliability, at bottlenecks – rather than providing entire new lengths of infrastructure paralleling both congested and uncongested sections of existing corridors (such as, for example, high speed rail to Scotland).

Eddington emphasises the need for congestion charging in order to maximise the benefits of the road investments he advocates and, without charging, as pointed out by Goodwin[14], it is clear from Eddington's own data that these road investments would only slow the rate of deterioration in congestion and unreliability rather than to reverse it. Goodwin also notes that changes in the way that taxation is accounted for in transport appraisal since the Eddington Report, together with a stabilisation or even reversal in growth in private car traffic, will further erode the benefits of the road investments reported by Eddington. Finally, the Eddington Report places much store on the additional productivity and GDP benefits calculated by the (then) new Wider Economic Benefits appraisal methodology developed by DfT. This methodology almost doubles the value of the NPV of the London Crossrail scheme, compared to that calculated only on the basis of time savings, vehicle operating costs and accident reductions. The agglomeration productivity benefits that form a large part of the Wider Economic Benefits of such projects are based on work by Graham[15]. However further work by the same author[16] has questioned the validity of his own initial assumptions and therefore the certainty with which these benefits can be assumed to actually exist.

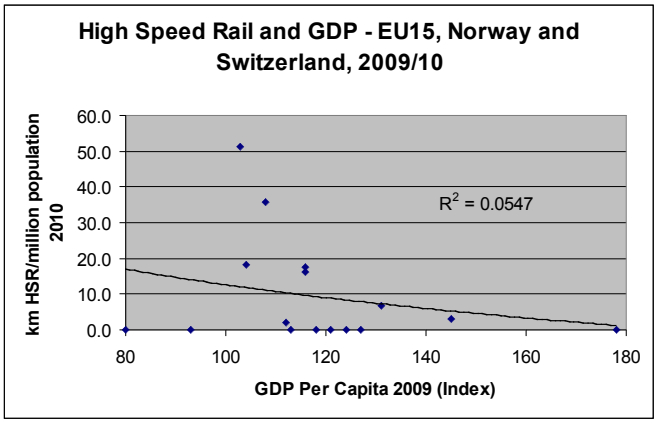
There are few empirical studies that have unequivocally been able to demonstrate significant economic development benefits as a result of transport investments.

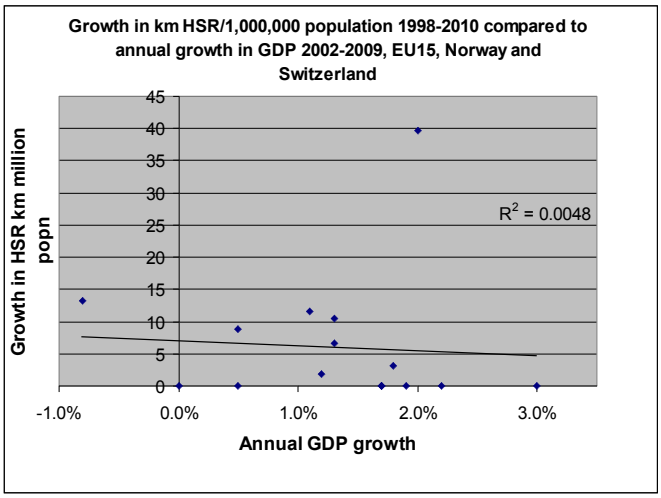
Banister and Berechman[17] review case studies of the M25 and a new LRT in Buffalo in the US; neither case studies reveals economic growth that can be seen to be additional to that which would have occurred without that transport investment. As noted in the Strategic Business Case for High Speed Rail to Scotland[18]:

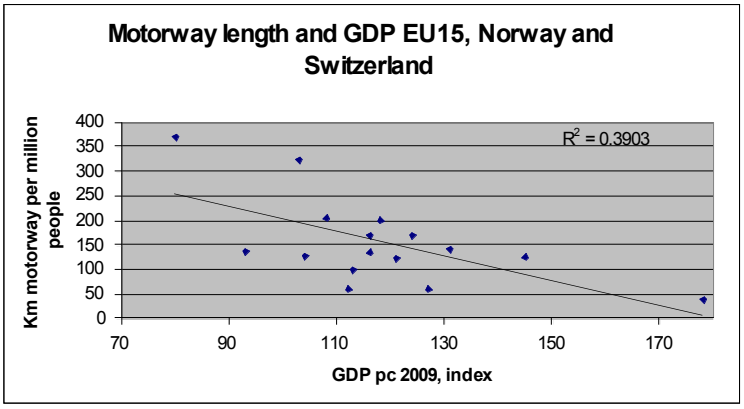
'*Development which occurs in Glasgow and Edinburgh following the opening of any high speed link will likely be redistributed from elsewhere rather than new development. This is the conclusion of previous studies, which suggest that up to 95% of development following investment in transport links is redistributed from other areas.'*

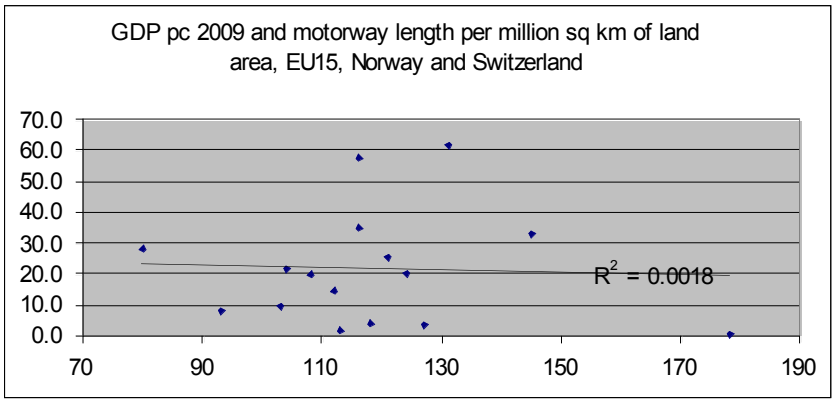
Lian and Ronnevik[19] reviewed 102 major road investments completed in Norway between 1993 and 2005. They were unable to establish any relationship between infrastructure investments and employment, income and industrial development, although they did find some evidence that these investments led to some agglomeration effects in regional centres, reducing leakage from them to larger Norwegian cities. Some positive labour market effects were also observed by their colleagues Gjerdåker and Engebretsen[20] due to regions being strengthened by road investment.

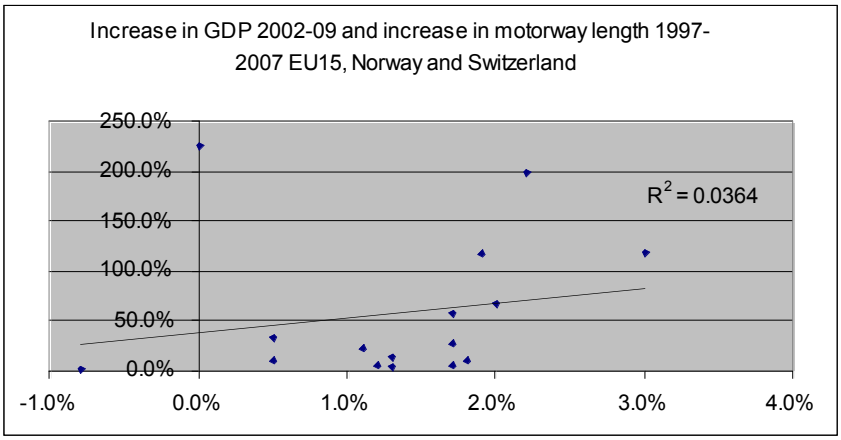
For this paper the authors have reviewed links between GDP, GDP growth and transport infrastructure investment in western EU member states (the "old" member states). The results are shown in the figures below, and indicate once again that there appears to be very little link between transport infrastructure investment and GDP – or, more probably, that GDP and GDP growth are much more affected by other factors and the effect of transport investment is so minimal as to be difficult to pick up.











There is a further issue of the direct employment effects of public investment in infrastructure (as opposed to secondary economic development effects in other industries and sectors). The authors of this paper could only find one source on this topic, Haller[21] (2008), which reviews two earlier Austrian and German studies (WIFO, 1999, and Baum, 1982) in the area. This shows that the jobs created per unit of money invested in transport infrastructure are greatest for traffic calming, inner urban roads, local rural roads, public transport, railway, and cycling schemes; and least for major roads and motorways. It is indeed inner urban roads and traffic calming that by far and away have the highest direct job creation impacts. The leakage of the expenditure out of the region in which it takes place is also at its lowest for simple, low-tech projects. This is shown in the table below.

From: WIFO (1999)		From: Baum (1982)	
Type of Investment:	Jobs(*):	Type of Investment:	Jobs(*):
		New motorway	3.987
Strategic Roads	5.759		
		Bypasses	5.980
		Major rural roads	7.508
Local Roads	7.679		
		Railways	10.691
		Bridge building	11.199
Traffic calming / Cycleways	11.505		
Railway tracks	11.505		
Public transport	11.735		
		Public transport	11.752
Railway stations	12.465		
		Local rural roads	13.174
		Inner urban roads	17.362
		Traffic calming	17.446
(*) Jobs directly created per billion Euros @ 2000 prices.			

In very brief conclusion, then, this section has presented some theoretical and empirical evidence of the impacts of transport infrastructure investment on economic

development. It is extremely difficult to conclude from the evidence presented that a clear relationship exists – in particular, the empirical evidence is very weak and in some cases runs counter to the assertion that more transport investment translates into more jobs, more wealth and/or more economic growth. In addition, it is interesting that the limited evidence available appears to show that lower cost, lower-tech transport investments result in greater *direct* employment effects than do higher cost, higher-tech alternatives.

6. THE WIDER IMPLICATIONS

So finally we consider the wider implications of the preceding discussion for transport appraisal more generally and for policies that seek to reduce journey times to increase economic growth, in particular?

We have seen that, while transport enhancements do generally reduce travel times on their specific routes, they do not reduce overall travel times. The economic advantage from the transport enhancements generally flows from the greater accessibility of more centres of activity to a wider proportion of the population and conversely the consequential enhanced economic vibrancy of those centres.

However there is also a counter argument that the saving of journey times may indeed be economically detrimental if the journey time in question had been previously used productively. On this basis therefore the only economic argument can lie with enhanced accessibility and economic vibrancy – rather than any related to specific time savings.

6.1 Transport Modelling

Virtually all transport models are based on the behavioural assumption that travellers minimise the 'generalized costs' of their journeys – a combination of money costs and time costs (using monetary values of travel time). How does this therefore work if travel time 'budgets' are consistent in the medium to long term? Indeed data relating to household income (National Statistics, 2004; Metz, 2005) shows that the proportion of household income spent on travel has broadly fluctuated around 16% for the past 25 years.

So is 'generalized cost' the correct decision-maker for traveller modelling? Should instead measures related to the perceived 'attractiveness' / intrinsic utility of travel (as is inherent in the modal constants used in existing travel time distributions) be the focus of modelling along with a macro objective of enhancing accessibility to a wider array of destinations within defined time budgets?

6.2 Transport Appraisal

So what is the potential impact on the STAG appraisal criteria?

- Environment – a transport enhancement is likely to lead to higher speed travel over a wider network – thus the environmental impact will cover a wider area and include a greater amount of travel with potentially greater energy use;
- Safety – once again the higher speed travel over a wider network may well increase the potential for more transport-related accidents (with a larger negative aspect to the appraisal);
- Economy – this has been discussed in some detail above – but the implication for appraisal would be to remove all 'travel time savings' (at present some 85% of the economic benefits of most appraisals) from the economic analysis but to add in evaluations for greater economic benefits related to enhanced accessibility, where these can be confidently predicted - it has been suggested however that specific journey time savings should be indicated separately for the information of the decision-makers;
- Integration – greater accessibility may lead to changes in the integration balance between the various transport facilities, transport and land-use and the need to review the balance of policy – the implications are not immediately obvious and will need further consideration; and
- Accessibility and Social Inclusion – the greater economic accessibility is a given from these conclusions, however the social accessibility / inclusion is not so obvious and any appraisal will need to adequately review this in relation to different people groups and locations.

6.3 Transport Policy

The existing policy assumption that reducing journey times increases economic growth has an underlying belief that this link is 'routed' through reduced travel times for users. However we have identified that users do not make use of the reduced journey times to do 'more productive' things but instead travel further to make use of additional facilities. Therefore while the basic policy assumption remains 'correct', it is actually for another reason.

Therefore there are implications for policy which need now to be taken into consideration. It is therefore suggested that transport policy should be refocused to:

- Measure differently the benefits of enhanced accessibility and be circumspect about our ability to predict the agglomeration benefits of new transport investment;

- Increase accessibility to additional economic activities for the whole community;
- Ensure that the average travel time 'budget' and proportion of household income spent on travel is not increased;
- Ensure that any increased travel distances do not produce adverse environmental effects and greater energy use (negative carbon effects);
- Ensure that transport related accidents are reduced;
- Enhance the potential for more productive travel time;
- Produce the most dependable travel times; and
- Not to reduce travel times below potentially '*minimum desired levels*'.

As an extension of this consideration, if indeed transport appraisal was changed in line with the suggestions above then a totally new and reduced array of potential transport enhancements are likely to emerge if 'travel time savings' are not included in the appraisal.

Notes

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