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RELATIONSHIP BETWEEN TRANSPORT AND ECONOMIC DEVELOPMENT

Transport and the Economy

SUMMARY REPORT

**The Standing Advisory Committee on Trunk Road Assessment (SACTRA)
Department of the Environment, Transport and the Regions, United Kingdom**

Addendum 1

Transmitted by the Government of the United Kingdom

Note: The attached Summary Report sets out the relationships between economic growth and transport, the measurement of these impacts in the appraisal system and the relationship between growth in GDP and transport intensity.

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Introduction

1. In 1996 the Standing Advisory Committee on Trunk Road Appraisal (SACTRA) was asked by the then Secretary of State for Transport to consider the effects on the performance of the economy which might be caused by transport projects and policies, including new infrastructure, changing prices, demand management and measures to reduce traffic. Following the change in Government in May 1997, we produced an Interim Report (December 1997) to assist preparation of the White Paper 'A New Deal for Transport: Better for Everyone'. We now submit our final report.

2. The report addresses four main questions:

- do transport improvements lead to increased economic activity?
- is it possible to 'decouple' growth in traffic levels from growth in the economy, in order to obtain the positive benefits of greater wealth, while reducing some of the negative effects of congestion and environmental impacts?
- are economic impacts fully captured in the procedures for estimating benefits and costs currently used by the Department of the Environment, Transport and the Regions?
- what recommendations follow for the Department's procedures and practice for transport appraisal?

3. Our terms of reference go beyond the specific question of trunk road schemes and, therefore, the Committee has aimed at a general approach which treats even-handedly all types of transport investment or policy initiative, for all modes. The best balance among these will vary from time to time and place to place in accordance with specific conditions and strategic considerations, but the principles and factual basis of appraisal should always be consistent.

4. In considering the effects of transport on the economy, we have borne in mind that transport policy also has many other objectives, including the improvement of safety, environment, travelling conditions, accessibility, integration and social inclusion. Provided that the successfully delivered benefits under these headings justify the costs, improvements may be well worthwhile even if they do not produce a positive effect on economic performance.

5. The Committee's conclusions in answer to the four questions are as follows.

Do Transport Improvements Lead to Increased, or More Efficient, Economic Activity?

6. Theoretical considerations suggest that the main mechanism by which changes in transport could have an effect on the economy is by a change in the costs of movement. We therefore defined a transport improvement as any intervention - whether by infrastructure investment, more efficient transport management, or otherwise - which successfully produces sustained reductions in transport costs, or equivalent improvement in service delivered.

7. These cost reductions accrue to different categories of traffic, some clearly contributing more directly to economic activity than others, which in some cases will be reflected in their higher valuation of savings in travel time. However, we have not found it possible or helpful to define an absolute distinction between 'productive' and 'unproductive' classes of vehicle or traveller. So while focusing mainly on the traded transactions measured in GDP, we must also make allowance for some important activities, producing economic welfare, which take place outside the market context.

8. Given these definitions of 'improvement' and 'the economy', theory suggests that there are a number of important mechanisms by which such transport improvements could, in principle, improve economic performance. These include:

reorganization or rationalization of production, distribution and land use;
effects on labour market catchment areas and hence on labour costs;
increases in output resulting from lower costs of production;
stimulation of inward investment;
unlocking inaccessible sites for development; and
triggering growth which in turn stimulates further growth.

9. Thus measures which reduce transport costs could encourage economic performance in various ways. Businesses can pass on the benefit of lower production costs to consumers in the form of lower prices, or they can implement further efficiency improvements by reorganizing production and distribution. The economy can also benefit if lower transport costs help stimulate easier transfer between jobs, or greater competition among firms.

10. We consider these theories, which deal with the linkages between transport improvements and economic activity, to be strong. They are internally consistent, and provide insight into a complex pattern of effects leading in different directions, not all of which are intuitively obvious - notably, for example, the 'two-way road' argument: this reminds us that improved accessibility between two countries (and, similarly, between cities, areas or regions) may sometimes benefit one of them to the disbenefit of the other. We emphasise that these theories as a whole should be subject to empirical testing before any of them can be taken as proved.

11. In the search for empirical evidence, we find that direct statistical and case study evidence on the size and nature of the effects of transport cost changes is limited. Some authors have claimed that national programmes of public investment, including road construction, lead to high rates of social return measured in terms of economic growth and productivity improvement. Other authors suggest that such effects do occur but on a smaller scale than has been claimed, and that, in general, any contribution to the sustainable rate of economic growth of a mature economy, with well-developed transport systems, is likely to be modest. Our investigations support the latter assessment. We have also reviewed available evidence from specific local studies seeking to detect economic impacts from completed transport investment projects in the recent past. The state of the art of this important field is poorly developed and the results do not offer convincing general evidence of the size, nature or direction of local economic impacts.

12. Thus 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 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.

Can Economic Growth be 'Decoupled' from Traffic Growth?

13. Many commentators have found a strong correlation between economic growth and road traffic growth, though there is not a consensus on the causes of this correlation. Recent discussion has observed that they have not been growing at the same pace, but traffic has been growing faster than the economy as a whole. The result is that the 'transport intensity' of the economy has been increasing, i.e., each unit of output is associated with a greater amount of movement of people or goods. Our investigations confirm this observation. The concept of transport intensity has some problems of definition and measurement which make it inappropriate as a target in its own right, but it has usefully focused concern about the economic and environmental costs of this road traffic growth by raising the question of whether it is possible and desirable to separate the two trends, in order to obtain the benefits of economic growth while reducing the costs imposed by traffic.

14. We separate this question into two parts. First, is the volume of traffic subject to influence by available policy instruments? Secondly, if it is, would doing so have a favourable or unfavourable economic effect?

15. Our consideration of the evidence leads us to conclude that income growth does have a strong effect on traffic growth, but that the amount of traffic is also influenced by the price, speed and quality of transport. An extensive literature of empirical studies suggests that this sensitivity is sufficient to result in a significant degree of variation in how much traffic will arise from any given level of national income. This leads us to conclude that policies intended to change the volume of traffic that will arise from any particular level of economic activity are, in principle, feasible.

16. We then considered whether doing so will have a positive or negative effect on economic performance. Answering this question raises an apparent paradox: we have noted above that reducing transport costs should assist economic performance, so how could it be that raising transport prices could be good for the economy?

17. In part, this paradox is resolved by noting that 'improvements', as defined above, and 'traffic reductions' are not necessarily mutually exclusive. Most authorities will combine a package of measures which interact with each other and are intended to produce a better overall outcome than each measure taken separately.

18. However, the more fundamental resolution requires recognition that 'transport costs' are not identical with 'transport prices' - the real resource costs that transport imposes on the economy include the hidden or 'external' costs of congestion, accidents, pollution and other environmental impacts. When these are included, the overall marginal cost of a trip to society may be quite different from the direct money cost of car use, or public transport fares, paid by

each individual traveller. The circumstances where reducing traffic levels could contribute usefully to economic performance are, in general, those where transport prices are currently below marginal social costs, primarily because of the existence of external costs of congestion and environmental damage.

19. In these circumstances, traffic reduction policies which result in a better alignment of prices and costs not only reduce the incidence of such external costs, but also, in doing so, can increase economic welfare. Conversely, where transport prices already fully include, or exceed, all internal and external marginal costs, measures to reduce traffic are likely to entail some sacrifice of economic welfare. Accepting that the full money valuation of all external environmental costs is not in prospect, it is still unavoidably necessary to make a case-by-case judgement about whether these costs are likely to be large enough to make the marginal social cost greater than the price, since this is critical to the whole analytical framework.

20. Questions of the geographical incidence of such benefits then have to be addressed. In the case where traffic reduction is achieved by increasing prices, the geographical incidence and nature of any additional benefits will depend, in large part, on the use of net revenues collected, since this would be the mechanism for determining whether the benefits 'stay in the local economy' or are passed elsewhere. It follows that the necessary conditions for increased transport prices to have a positive economic impact in a particular target area are likely to include well-judged recycling of the revenue in the area for purposes which are themselves good value for money.

21. In practice, it is often the case that traffic reducing measures are implemented using non-price methods, such as reallocation of road capacity, some forms of parking control, pedestrian zones, selective bans on certain categories of vehicle or certain times, etc, since these can have significant operational advantages, as well as having a history of tried and tested experience. The economic analysis of these methods is more complex, as in such cases direct net revenues will not be generated, so that this mechanism for influencing the incidence of benefits is not available. The economic effect will therefore tend to be determined by the precision with which the policies can be targeted on appropriate classes of traffic, in specific parts of the network: for example, scarce road capacity may be more effectively utilised if space is reserved for specific categories of vehicles (eg, buses, lorries, high occupancy cars, emergency services) and some cities make special arrangements for delivery lorry access at convenient times to areas where vehicles are otherwise excluded. Empirical evidence exists of many cases where some non-price measures, especially pedestrianization of town centres, have had successful local economic effects, but provides no information on whether there are any net effects at a national level.

22. To sum up: we have a strong theoretical basis for identifying conditions where measures may increase some direct prices, reduce traffic, reduce resource costs, and also have a favourable local or national economic impact. There is extensive empirical evidence on two aspects (the sensitivity of traffic levels to some cost changes, and the local economic effects of pedestrianization) but not on effects on economic performance at a national level. The degree of traffic reduction to aim for, and the selection of specific measures, will vary according to the circumstances, and should therefore be the subject of cost benefit appraisal, as in the case of infrastructure investment.

Are Economic Impacts Captured in Current Procedures?

23. The underlying assumption in the appraisal of most transport improvements is that direct benefits and costs (such as reductions in travel time) may be converted into wider economic effects (such as reduced wage costs or higher property values) by the operation of the market. Crucially, these final effects are assumed to have the same total value as the initial impacts, and not to be additional to them: this implies that in general, the value of direct transport benefits must decline if indirect economic benefits are to grow. The identity of initial and final benefits is a theoretical proposition arising logically from the assumption of 'perfect competition' in the economy as a whole - that is, an economy where all prices are correctly aligned to the costs of production by (among other conditions) active competition among enough firms to ensure that none can dominate the market.

24. If these conditions hold, we concur that the value of the estimated costs and benefits to transport users (notably time savings, operating costs and accident reduction), and to non-users (notably environmental impacts - provided that they have all been identified and a money value attributed to them) would give a full and unbiased estimate of the value of the overall economic impact. This is equivalent to the statement that no 'additional' economic value exists. However, the incidence may change, as the initial transport benefits may accrue to different people from those who receive the final economic benefits.

25. In such cases, a high-quality assessment of the transport and environmental costs and benefits will be the best practical approach to assessing the value of the overall economic effects. If the estimated transport costs and benefits are complete, and conditions in the economy are of all-round perfect competition, it will not be possible to demonstrate credible proof that there are additional benefits from wider economic effects.

26. Having clarified the basis of the conventional assumptions, we now move to a major part of our work, which has been the identification and analysis of three important general cases where the calculation of transport costs and benefits will not give the full economic impact. These relate to the completeness of the transport appraisal itself, the existence of imperfections in the economy, and the spatial incidence of impacts.

Completeness of the Transport Appraisal

27. First, the logical identity of the value of transport and economic impacts will not apply if the transport assessment is itself significantly incomplete, either in its calculation of the transport effects or in its conversion of those effects into money values.

28. The calculation of the transport effects needs to take account of all sources of transport costs, and all the important direct and indirect behavioural responses of individuals and firms, in the short and long run, to changes in those costs. This is necessary in order to make an accurate assessment of the resulting pattern and conditions of travel and environmental effects. These conditions are not usually fulfilled: in practice, simplified assumptions are used which leave out some important responses.

29. We therefore make recommendations on the importance of improving conventional appraisal methods, with a special focus on the modelling and forecasting of freight movement

and travel for business purposes whose connection with economic activity is more direct. We also comment on improvements in the treatment of travel time and reliability. Calculation of the transport impacts will need improved treatment of the patterns of behavioural responses of individual travellers and of companies (such as structural changes in land-use, production and employment) since these may themselves have further impacts on the volume and pattern of traffic, and the resulting costs.

30. Even if the transport effects are fully estimated, the identity of their value with the final economic value can then only apply if all those transport impacts are correctly expressed in terms of their money values. This condition is also not usually met, and is not in prospect. Money values are attributed only to some of the known transport impacts. In particular, conventional transport appraisal will usually describe the physical impacts of environmental effects, but not their economic costs. Similarly, the effects of transport changes on land-use - when they are systematically estimated at all, which is rare - are not expressed as user benefits in money terms.

31. We do not make further recommendations about the money valuation of environmental impacts, beyond those discussed in the Committee's 1992 report, but we stress that environmental costs represent real economic resources even when their money values are not calculated: from this point of view, the description of physical impacts in a conventional environmental appraisal carries the implication of economic impacts. Therefore, the conventionally calculated transport net present value alone, because it does not include environmental costs, can only provide an unbiased measure of the value of the final economic impact in the case where there are no environmental impacts, either positive or negative.

Imperfections in the Economy

32. Secondly, real economies may not be perfectly competitive. We have considered two main classes of imperfection, both of which are marked by a difference between the prices charged, and the real economic value of the resources used. These imperfections are:

- price levels for goods and services which differ from efficient resource costs if there are distortions caused by imperfectly competitive product, labour or other markets, subsidies and taxes; and
- external costs, such as congestion and environmental damage, both in the transport sector and from economic activities in general, which have not been included in the price charged.

33. If these imperfections exist, analysis demonstrates that the value of initial 'transport' impacts will not be the same as the value of final 'economic' impacts. In that case, even the most complete conventional appraisal method that could, theoretically, be devised (which we have called a 'fully-specified' cost benefit analysis) would still leave out some wider economic impacts. These are the circumstances where claims for additional economic impacts, with a value which is not captured in the calculation of direct transport benefits and costs, may be valid. Thus even if the uncharged cost of congestion, say, is included in the conventional assessment of transport benefits, it will still be necessary to make further allowance for the effects such imperfections have on the operation of the economy as a whole.

34. A key conclusion of our work is that these additional economic impacts, over and above the value of direct transport impacts, may be either positive or negative, depending on whether prices are higher or lower than marginal social costs, which in turn depends on the combined effect of divergences between price and marginal cost of output, taxes and subsidies, and uncharged external costs. Therefore there will be some conditions where including wider economic impacts would lead to an increase in the value for money of a transport improvement, compared with a conventional appraisal, and other conditions where including these wider impacts will lead to a reduction in the value for money.

35. For example, if local prices are in general too high due to monopoly power, then a transport improvement, if it successfully opened the area to external competition, could lead to additional benefits for the economy. Conversely, if transport prices are currently too low due to uncharged congestion or environmental effects, then a transport improvement could lead to additional costs for the economy.

36. These two examples illustrate a potential effect of prices which are too high in the transport-using sector, or too low in the transport sector, but these are not the only conditions which could apply. We have identified at least eight different hypothetical conditions, which are defined by different combinations of price imperfections in the transport-using and transport-providing sectors. None of these cases could be ruled out on grounds of logic or inherent implausibility, so we searched for empirical evidence on the likely occurrence of each of the cases.

37. Evidence does exist that it is quite common for prices to be higher than marginal private costs of production in many sectors of the economy, but lower in a few subsidised sectors. There is also much evidence about the existence of external costs of transport, and some other industries, and in some cases of their values. This establishes that such departures from perfectly competitive conditions are real. But some of these effects lead to prices which are lower than marginal social costs, and others lead to prices which are higher. At present we have not found evidence of their combined effect on the relationship between prices and full social marginal costs. Therefore we cannot assess the relative incidence of transport projects sitting within each of these cases. At present there is no basis for judging whether the positive cases (i.e., where inclusion of wider economic effects would increase the net benefits) are more or less frequent than the negative cases (i.e., where inclusion would reduce the net benefits).

38. For this reason, assessment of the economic impacts would have to be calculated for each case, based on the specific conditions in sectors (or economic activities) in areas affected. The calculation would depend on assessment of the incidence and magnitude of imperfect competition and uncharged external costs, in both transport-using and transport-providing sectors.

39. This assessment will determine whether the usual perfect competition assumptions are, in each case, valid, or whether allowance for wider economic impacts needs to be made, and - if so - whether these impacts will increase, or reduce, the value for money of a transport improvement.

Spatial Distribution Effects

40. Thirdly, the direct transport effects are often assessed, for practical reasons, only for a defined area in the neighbourhood of the transport improvement. Studies in economic geography confirm that there is no guarantee that transport improvements will benefit the local or regional economy at only one end of the route - roads operate in two directions, and in some circumstances the benefits will accrue to other, competing, regions. Thus, in the important case discussed above where monopoly prices in a sector may be reduced by competition from outside, some benefits, such as increased employment, may accrue to the distant competitors rather than the local producers. Assessment of whether economic impacts will actually benefit the intended target area will need to consider impacts outside the immediate neighbourhood. This is the case whether or not imperfect competition applies. Therefore, greater attention should be paid to the question of where the impacts will occur, and on whom they will fall.

41. This analysis highlights the importance of considering the 'winners and the losers' separately, in addition to the usual procedure of adding them all together into an overall impact. This is particularly important if it is indeed the case that the initial transport impacts will be converted into different effects on the economy, since the initial and final beneficiaries of the intervention may be quite different: the initial winners may end up losers. It follows that where transport interventions are expected, or intended, to have economic impacts in any particular area, there should also be consideration of the impacts on other competing areas as an integral part of the appraisal.

Recommendations for Appraisal

42. In practice, the Department has to deal with a wide variety of transport projects and policies, and in all of these - whether or not there are wider economic consequences - a high quality assessment of the transport and environmental costs and benefits remains central to the appraisal process. Because any wider economic effects may then go in unintended as well as intended directions, and may accrue to other than the intended area, we consider it important that some degree of formal consideration of these effects should be applied to all substantial projects, policies and interventions (whether road or rail investment projects, traffic management schemes or traffic reducing strategies), not only to those whose main declared intention is to promote regeneration.

43. Our recommendations for doing so are as follows:

We propose a new formal procedure, early in the process of appraising all important transport projects and policy initiatives, requiring consideration of the rationale for the intervention and initial consideration of whether the relevant prices, in the transport-using and transport-providing sectors, are likely to be greater or lower than full marginal social costs.

A wider economic impact assessment should then be carried out in all cases, though the level of detail warranted will depend on the results of the initial consideration. The assessment would include:

- any additional effects after taking account of the actual relationship between prices and full marginal social costs in the transport-using and transport-providing sectors; and
- the incidence (spatial, sectoral and social) of estimated gains and losses in economic activity.

Our broad conclusion is that the conventional social cost benefit procedures need to be improved if they are to do full justice to the direct transport behavioural responses and choices, let alone the complex effects of these on the economy. In all cases, therefore, we recommend improvements to current procedures to bring them closer to a 'fully specified' conventional cost benefit analysis. These improvements will include special attention to the short, medium and long term effects of projects and policy interventions on vehicle ownership, frequency and structure of travel, and land use, for passenger and freight movement.

We suggest a standard 'Economic Impact Report', which would bring these strands of work together into an overall statement to be applied to all major transport projects and interventions, derived from the form of analysis described here, including explicit treatment of any expected structural changes in production, service, resource and labour markets, and explanation of the mechanisms expected to bring these about. It is important that this Report should include estimates of the patterns of changes in economic activity and jobs between areas and sectors, so that not only are the winners identified but also the losers.

44. We recognize that some of the proposed improvements represent relatively easy changes to present practice, based on existing knowledge, while others will require new research, or more fundamental changes to current models. Therefore our recommendations envisage a staged programme of improvements.

Concluding Comments

45. A large part of our investigation has been concerned with the economic impact of transport initiatives in the context where prices are not, in general, set equal to full internal and external marginal costs. If they were, there would in principle be a positive impact on the economic effectiveness of all other transport interventions. This is because the volume and pattern of traffic would be altered to different, more economically-efficient levels: this would provide the context, and in some cases the funds, to enable a new, better-judged, balance of infrastructure investment for the various modes and more efficient management of the systems we already have.

46. It is because such optimal pricing frequently does not apply, that assessment of the price conditions is the critical step which can allow appraisal to identify the conditions in which improvements may assist the promotion of economic growth. And the same assessment also enables identification of conditions where traffic may be reduced without harming the economy (and, indeed, potentially benefiting it) if done by pricing mechanisms which restore the relationship between price and marginal cost, or by well-targeted non-price instruments.

47. We conclude that there is scope for carefully judged policies which help to decouple the rate of traffic growth from the rate of economic growth, thereby reducing the environmental and

congestion costs of traffic and also - to some extent - assisting in delivering the benefits of economic growth. Such policies include pricing, management and investment initiatives, in a balance which will vary according to the specific circumstances of each intervention. Appraising each case requires improved assessment of the conventional transport and environmental impacts, together with a more systematic consideration of the impacts on the wider economy.
