

draft 4-3-11

Travel Time Savings and Travel Time Conservation: a reconciliation

1. The saving of travel time is conventionally treated as the main economic benefit arising from investment in the transport system – because time saved by travelling faster can be put to valuable uses. However, findings from the National Travel Survey show that average travel time has held steady at about an hour per person per day for over 35 years, despite investment in the transport system worth over £100bn. How might these seemingly contradictory perspectives be reconciled?

Shopping

2. Consider a simple numerical example involving 100 individuals who all live in zone 1, of which 80 shop in zone 2 and 20 shop in zone 3. At the outset, it takes 10 minutes to make the round trip to zone 2 and 30 minutes to make the round trip to zone 3. Consider an improvement in the transport system that brings the round trip to zone 3 down to 20 minutes, but leaves the time to zone 2 unchanged. Suppose that this improvement results in 20 users switching their shopping from zone 2 to zone 3. In this situation, the original 20 shoppers who continue to go to zone 3 each *save* 10 min travel time (total 200 min), whereas the 20 shoppers who switch to zone 3 each *incur* an extra 10 min travel time (total 200 min). So total travel time for the whole population remains unchanged – thus there is no extra time for work or leisure activities - but some shoppers have gained access to the better shops in zone 3 as a result of the improvement. This is the NTS outcome in miniature.
3. The conventional approach to appraisal of this improvement would be as follows: the original 20 users who continue to go to zone 3 each benefit by saving 10 minutes travel time, and there are an extra 20 zone 3 users, each of whom benefit by an average of 5 minutes (applying the ‘Rule of a Half’), giving a total transport user benefit of 300 minutes, even though total travel time remains constant.
4. The ‘Rule of a Half’ (RoH) is a standard device for estimating the benefits arising from new travellers. Because they are new, they must value the trip at less than the ‘before’ cost (or they would have travelled before) and not less than the ‘after’ cost (or they would not be travelling now). On average it is supposed that they value the trip at the average of the old and new costs. In the present example, application of the RoH generates a benefit of 100 minutes, arising from an average of 5 min per person for the 20 persons switching from zone 2 to zone 3.
5. This RoH benefit is the net benefit – the benefit arising from the superior worth of the shopping to be had at zone 3 *less* the extra travel time to get there (10 min in this case). So the worth of the superior shopping alone has on

average a value equivalent to 15 min per person (which could be converted to a monetary value using a standard monetary value of time). For the 20 people switching, the total value is 300 minutes. Hence the total benefit of 300 min may be viewed as representing the enhanced worth of the new destination compared with the old, for those who switch, in a situation in which overall travel time of the whole population is unchanged.

6. Thus the RoH may be used to estimate the benefit of the investment in enhancing access, provided the extra travel time is added back. In a situation in which the total travel time of the population of travellers does not change as a result of investment in improved infrastructure, the benefit of the investment would be the sum of the RoH benefits for those who switch to more distant destinations *plus* the extra travel time taken by these same people. Given that this extra time is equal in aggregate to the time saving of those who do not switch destinations, the benefit of the investment is equal to the travel time saving plus RoH benefits. We have thus reconciled an approach based on valuing the additional access with the standard approach.

Commuting

7. Consider an alternative version of the three zone model discussed above in which zone 1 is where people work and zones 2 and 3 are where they live. As a result of the transport improvement, 20 commuters move house from zone 2 to zone 3. Unlike the shopping case, where we could reasonably assume that the existing shopping facilities in zone 3 will accommodate those who switch, there will be changes in land use – either in the form of new houses built or, if this is not permitted by the planning regime, in the form of higher prices for existing properties, reflecting the enhanced access to employment opportunities. Either way, part of the benefit of the transport improvement is captured – in a location-specific manner - by land and property owners, and developers.
8. Furthermore, the commuters who move house to zone 3 vacate property in zone 2, which will have an adverse impact on the value of other properties in this zone and, in the absence of inward migration, may lead to dereliction. This is the pattern seen in US ‘rustbelt’ cities when the inhabitants who can afford new houses move to the suburbs. On the other hand, where cities are economically dynamic, low cost property in the inner areas may attract migrants and business start-ups, as has happened in London where there was a loss of over a million people in the 1960s and 1970s, followed by growth of population since 1990.

New business district

9. Consider a further version of the three zone model in which zone 1 is where people live (the suburbs), zone 2 is the original central business district, and zone 3 is a new business district. The improvement in transport provision from zone 1 to zone 3 allows the new business district to grow. In this case, the resulting development in zone 3 is commercial property, which might be low value offices for back office staff that could vacate higher rental office in

zone 1; or might be high value accommodation for head offices which prefer the modern ambience of zone 3. There is evidently no relationship between the value of the land use changes arising from improved access and the value of the time saving based on standard values of time.

10. London's former Docklands have provided both high value offices at Canary Wharf and lower value space elsewhere. The development of Docklands helped contain rental increases in the City, as London grew as a world financial centre. The possibility that a high value development might be created was not considered at the time the first phase of the Docklands Light Railway was planned, nor could such an outcome be reflected in an appraisal based on time saving.

Discussion

11. The original, simplest formulation of the conventional approach to transport scheme appraisal was to assume that trip origins and destinations are fixed, from which it followed that improvements resulting in faster journeys yield savings in travel time, which have value. Subsequently, it was allowed that trips origins and destinations might change as a result of the improvements. Nevertheless, supposedly real savings in travel time have dominated the appraisal of benefits.
12. If, however, we assume that average travel time remains constant, in line with the NTS findings, then it necessarily follows that there must be changes in access and land use, which have spatial and distributional consequences. Such land use changes are the inevitable long run consequences of transport investment, and neglect of these arguably detracts from the fitness for purpose of the appraisal methodology.
13. For example, consider the economic case for Crossrail as set out the DfT 2005 paper on 'Transport, Wider Economic Benefits, and Impacts on GDP'. This estimates net present values of £12.8bn for conventional travel time saving benefits, and £7.1bn in addition as wider economic benefits, including in particular agglomeration benefits. Agglomeration benefits arise from enhanced access as viewed by businesses and are location specific. Travel time savings supposed to arise from transport infrastructure improvement may be expected over time to be largely converted to access benefits by commuters taking advantage of Crossrail to gain access to more distant housing in environmentally pleasant locations, within the time they allow themselves for travel and utilising the higher speeds made possible. For instance, the tunnel under Central London will save 10 minutes between Paddington and the City, thus allowing 10 min commuting from more distant destinations to the west of London, whether by rail or by longer car trips to stations on the route. The land use consequences are specific to the locations thus affected. The distributional consequences reflect in part the economic rent which arises from the 100-fold difference between the value of agricultural land and the same land with planning consent for housing.

14. One element of the Crossrail travel time saving which could properly be so scored as a long run benefit is the saving in travel time between Heathrow airport and Central London, given that these uses of land are unlikely to change. But this is the exception to the rule that overall time saving is converted to access benefits in the long run, given that average travel time across the population is stable.
15. In conclusion, in the long run the population as a whole takes the benefit of investment in the transport system in the form of additional access to more distant destinations, not in the form of time saving. While the standard methodology may be used to estimate the overall benefit in units of time, this methodology fails to characterise the location-specific nature of access benefits and the fact that land and property owners achieve gains from the investment. It fails also to recognise the upside development potential as seen at Canary wharf. The standard methodology therefore misleads in that the actual long-run outcomes of investments are land use changes whose attractions will often be more debateable than time savings.

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