



Value of Working Time and Travel Time Savings

Long Run Implications Report

December 2009

DfT



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MARK BRADLEY RESEARCH & CONSULTING



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1. Introduction

1.1 Background

Mott MacDonald, in association with Hugh Gunn (HGA), Howard Kirby (Transport Research Institute, Edinburgh Napier University, TRi), Mark Bradley and Accent Market Research (the “consortium”), have been commissioned by the Department for Transport (DfT) to undertake a detailed study of the Productive Use of Rail Travel Time and Work Value of Travel Time Saving, with the primary goal being to:

“undertake a stated preference study of rail business travellers to obtain direct evidence on the productive use of travel time during the course of work and to assess its impact on the work value of marginal travel time savings” (Department for Transport, 2007).

The study reported in June 2009 in a document entitled “Productive Use of Rail Travel Time and the Valuation of Travel Time Savings for Rail Business Travellers - Final Report”. Subsequent to this are two further technical notes/addendums have been produced:

Firstly a note detailing additional analysis to address the issue of the average amount of time spent working on-train versus the marginal value implied by a journey-time saving; and

Second a report assessing the issues implicated by the research findings (“Productive Use of Rail Travel Time and the Valuation of Travel Time Savings for Rail Business Travellers - Issues Report”, July 2009).

A final area of study requested was that of assessing the impact of the results upon longer term behaviour and its likely impact on WebTAG appraisal values for time savings for rail business travellers. This short report covers this final area of study.

It should be noted that in the remainder of this report the term SPURT has been used for the study, this meaning Study of the Productive Use of Rail Travel-time.

1.2 Purpose of analysis

The SPURT data set collection and the IWT study commissioned by DfT has concluded, producing new evidence about the time use of Business (IWT) travellers using trains. A large sample has been drawn from IWT rail travellers across England and Scotland. The results have been analysed to produce, amongst other things, estimates of 'Value of Time' for the group as a whole, and estimates broken down into several

sub-categories (including travel duration and crowding level). The results are fully set out in 'Productive Use of Rail Travel Time and Valuation of Travel Time Savings for Rail Business Travellers' (Mott McDonald et al, 2009).

The Value of Time (VoT) results derive from responses to key Stated Preference questions, allowing estimation of travellers' own benefits from travel time savings, and Stated Intentions questions, asking about the likely impact of earlier arrivals for a recent journey on time use. A focus here was the impact on time spent working on the train, and on the use of the saved time for work purposes.

This short Report has been commissioned to consider the implications for likely Long-Run IWT VoT for train travellers, given that fore-knowledge of faster train services could have an impact on wider activity scheduling, allowing better (more productive) use to be made of time savings. The results set out below are speculative, but are intended to provide insight into this question. A more detailed research programme to investigate this issue is proposed in the main Report.

2. Key factors affecting short and long run values

2.1 Background

The established wisdom underpinning the values currently attributed to saving travel time for IWT travellers is to assume that this saved time becomes wholly productive, and can be valued at the wage rate (plus on-costs such as insurance and pension). This is on the grounds that hiring at a greater rate would be loss-making. This approach has been challenged for over thirty years, on the basis that travel time itself can be used productively (so saving it would just change the location at which work was done, to no-one's advantage), and that not all time savings would be used for work purposes. There is an issue of the relative productivity of work done whilst travelling relative to that at more usual locations, but essentially the key factors are the impact of travel time savings on the amount of work done (netting losses during travel time against gains outside of travel time), the 'Employer's Value', and the potential gain to the traveller himself from a reduced travel time which could result in an increase in leisure time outside of travel (the 'Employee's Value').

Were travel time to be totally unproductive, and all travel time savings simply re-allocated to productive work, the 'established wisdom' would hold. However, for the rail mode in particular, it is perfectly obvious (and commonly observed) that work is undertaken during IWT journeys. Further, when it is recalled that business trips starting or ending at home are classified as IWT trips, it is extremely unlikely that travel time savings are all converted back to working time. The SPURT survey confirmed these points, and allows us to quantify the effects on IWT VoT.

Several points can usefully be made at this stage.

Firstly, in respect of the difference between short-run and long-run values. In the short-run, a travel time saving may turn out to be unproductive simply because the re-organisation of other activities (both for the business traveller and potentially for others with whom he has to interact) may be impossible in the short term. Arriving early for a meeting scheduled at 11.00 am may result in 'time to kill' rather than extra productivity – but with foreknowledge of a faster journey, the meeting might be re-scheduled. We try to take account of this for the long run below.

Secondly, productive use of time savings of the order involved in the experiment (up to a maximum of 20 minutes) are highly unlikely to have an impact on the traveller's salary. In the short run, work may be undertaken for a variety of reasons – simple professionalism, hopes of

promotion or bonus (or simply job security) and so on. For this case, we have assumed that all saved time can be valued at the 'discretionary' own-value given by the SP experiment. But in a long-run scenario where better use can be made from a productivity point of view, it is assumed that the 'discretionary' benefit only applies to the fraction of saved time not diverted to work purposes, with the employee being compensated through wages for the other fraction (note also that this can be argued to have some impact on forecast salary levels, which we know does not happen in current practice).

Thirdly, we have to recall that the SPURT survey deals with earlier arrivals; later departures with the current arrival time would clearly offer a different picture for many travellers – particularly for journeys originating at the home. However, there is some sort of symmetry here, in that a converse effect would be felt for journeys ending back at home. On balance, our judgement is that the SPURT data set is adequate for the present purpose, although it would be interesting to test this assumption.

Lastly, the 1994 Road Users' VoT Study (Accent and HCG) carried out the same data collection and analysis for business travellers as is reported in our main Report; the results are quite different, in that very little work is reported from car users, and it is far more common to intend to return to the workplace should journey times reduce.

2.2 Existing trends

In the main SPURT study report, we have reviewed the evidence from the Dutch studies of the mid 1980s and 1990s, in which it is apparent that there was a large increase in the proportion of rail business travellers' travel time spent working; the UK figures of 2007 indicate an even higher level. The obvious causes of this trend are in the general availability and use of mobile telephones and laptop computers, which together have served to reduce the importance of the fixed workplace as a location for an effective contribution to business activity.

In the computations reported below, we have not extrapolated this trend – which would be to further reduce the value of IWT travel time savings as simply shifting the location of productivity rather than increasing it. We would simply note this as a subject worth further research, perhaps in the light of anticipated trends in types of business activity in future scenarios.

3. Analysis of scenarios

3.1 Scenario definition

Given that the SPURT study has survey results relating to short-run impacts of travel time savings, we now look to what guidance can be given to potential users of advice on evaluation of long-run time savings, users who would otherwise default to the WebTAG 'current wisdom' of valuing these at wage-rate-plus-on-costs.

As we have said above, the key issues concern the effect of travel time savings on net productive time – time lost working on the train (weighted by a productivity factor) versus time savings used for work, plus any 'own value' of time savings diverted to leisure. We set out in the next sections the results from evaluating five possible scenarios:

- **Scenario 1** is the 'status quo' WebTAG scenario, evaluated over our sample. We assume all saved time is valued at the wage rate plus on-costs.
- **Scenario 2** looks at the evidence of the working time lost on the train, but assumes all saved time goes back to work (i.e. is productive).
- **Scenario 3** takes account of the reported leisure time increases recorded for home-based trips in addition to the working time lost on the train, but also assumes all saved time goes back to work for other trips
- **Scenario 4** differentiates between trips returning home (for which the use of the saved time is that reported in the survey); outward trips from the home (for which the relative use of saved time is assumed to be 50%, assuming half the journey time reduction means a later start from home and half mean an earlier arrival at the work-place); and other (non-home-based) trip (assumed to be 100% productive).
- **Scenario 5** is the short-run situation, with levels of in-train working and proportions of saved time returned to work as in the SPURT survey.

Technical matters concerning how the analyses were undertaken are summarised in Appendix A, and some information about various features of these scenarios is included at Appendix B.

3.2 Summary of results

For the five scenarios discussed above, we can recover the following five VoTs, all in £ per hour (2008 values), as shown in Table 3.1.

Table 3.1 - Value of Time (VoT) for scenarios (£/hr, 2008 prices)

Scenario	Employer's VoT	Employee's VoT	Total VoT
Scenario 1	39.09	0	39.09
Scenario 2	25.11	0	25.11
Scenario 3	10.89	7.07	17.96
Scenario 4	9.51	7.16	16.67
Scenario 5	4.69	17.80	22.49

The conclusions are quite clear; the in-train working time lost from reductions in journey times (the difference between scenarios 1 and 2) are the major factor; VoT reduces to 65% of the 'existing wisdom' value. When account is taken of the likely diversion of time savings into leisure time, another 30% is lost, and this is only because the 'value' lost by the Employer is transmitted to the Employee (as free time), and is valued in the form of a non-monetary benefit.

3.3 Comments on analysis

The assumptions behind the 'existing wisdom' approach may have been realistic in the 1960s, when the approach was adopted. They are evidently not appropriate to the 21st century. The likelihood is that technological advances will make mobile working more effective and wider spread than now. The data would allow some exploration of the consequences; they would be to further diminish the value of speeding up the rail system, for the business traveller. The likelihood is that the value of improving rail services to accommodate working practices would emerge even more strongly.

Meanwhile, it is clear that cross-sectional models (such as the NTM) could never identify the increased attractiveness of rail as a result of factors other than time/cost competition with other modes. Time/cost competition can be inferred from modal shares in the cross-section. Factors affecting the intrinsic attractiveness of the modes cannot.

From our review, it became clear that many more rail travellers than the business community were using their journey times for work purposes; many commuters were taking advantage of the journey to take on tasks they would otherwise face at the office. This aspect has not been part of our study, but we have recommended it for further research.

4. Conclusions and recommendations

4.1 Key conclusions

The results of this research call clearly for a downward revision of WebTAG values for Rail IWT travel time savings, to somewhere between 65% and 50% of current values.

With further analysis a closer figure may be possible to be arrived at, but this has not been possible within the current timescale and budget available.

4.2 Additional areas of research

As already set out in the main study report, we would recommend the following additional areas of analysis to provide a full picture of the implications of working practises upon travel time savings across all modes.

4.3 Additional analysis of the SPURT data

The SPURT data-base could be further enhanced by (1) the coding up of (a) the additional 104 responses received after the cut-off-date; (b) any uncoded "written in " responses, these being the stations boarded (Q5) and left (Q9), and the "other" responses to Q35 and Q38; and (c) any further verification/validation checks that are identified; and by (2) being documented appropriately such that it can then be deposited in the national Data Archive and available for use by other researchers.

It is recommended that further checks are carried out to ensure that the expansion of the SPURT 2008 data to the Autumn 2007 NPS wave is reasonably consistent with that implied by the contemporaneous NPS Spring 2008 data now that that is available; that further check be undertaken on the sensitivity of the national estimates to different ways of expanding the sample data; and that consideration be given as to the whether, in association with other government departments, in particular ONS, there is a need for an advisory manual on best practice in expansion procedures and in estimating the accuracy of the expanded data.

Consideration should be given to valuing the time spent on "work NOT related to employment" and the value of travel-time saving for such work (the SPURT data shows that one-in-six of those who do no work related to employment do other kinds of work or study. Whether that is work for a voluntary body such as a charity, and whether it is fee-based, is not known; or it might be personal study.

Further investigations be undertaken to understand the effect of different factors on the impact of reduced journey time on-train and off-train amounts of work, possibly using the twice a year National Passenger Survey as a vehicle.

In linking the RP and SP data together above, we have assumed that the SP valuations could be taken in full for each unit of time saved from travel. This assumption is based on the expectation that the traveller would have formed a view on the impact of the time savings on his/her activity mix by the time the SP questions were posed. This issue could be studied in more detail, from the existing data, looking for variations in the responses of those with different mixes of work and leisure activities, on- and off-train.

4.4 Additional rail data capture

The productive use of travel time by rail commuters and others should be estimated in a similar study, and the value of that use be taken into account in appraisals. This is based on the evidence in the NPS 2004 study that commuters as well as business travellers spend travel time working productively; and the evidence in the present (SPURT 2008) study that the proportion of business travellers who spend some time working has increased since 2004.

Further comparisons with the NPS 2004 data should be undertaken to establish on a like-for-like basis the extent of the change over time in the percentage of time spent working (by business travellers who do some work on the train); and to appraise whether any of the differences over time (in either this percentage or in the proportion of business travellers who spend some time working) might be explained by differences in other variables.

In order to improve results related to crowding, consideration should be given to increasing the sample size for trains with high crowding levels, whether for further studies of the SPURT kind or studies of the NPS kind.

Agreement should be sought with those responsible for on-going surveys (such as NPS or the Omnibus Survey) for the inclusion, perhaps every two or three years, of a set of activity-related questions similar to those asked in the NPS Autumn 2004 wave, but taking into account experience gained in SPURT 2008, in order to monitor trends over time.

Behavioural studies should be undertaken to assess the extent to which travel demand for a particular mode is influenced by the ease or difficulty of being able to work productively (or relax productively), given the evidence in this study that being able to sit all the time; that availability of a fixed table and of a power socket all have some influence on the proportion undertaking work.

Additional analysis and surveys to focus upon inter-metropolitan rail business trips (these form a segment of the SPURT data set, but it is not sufficiently large for a focused analysis to be undertaken at the present time).

4.5 Assessment of other modes of transport

We recommend that a scoping study on the productive use of travel time by car travellers be undertaken, which would review studies such as the 1999 AHCG report on “The Value of Time on UK Roads” and any reports and data availability issues from mobile phone operators and those concerned with the safety aspects of in-car mobile phone use, to assess the need and requirements for further work in this area.

An assessment for other forms of business travellers' transport (car drivers, passengers and local public transport users) of the value users would ascribe to time savings, and the impact these would have on their intentions and ability to work during the journey.

A similar scoping study on the productive use of travel time by air travellers should also be undertaken, taking into account the opportunities for both in flight and in-terminal working and such studies as airport and airline operators may be able to provide, with the aim of identifying how a more detailed assessment may be made of productive time use.

A similar study to SPURT focusing on airport access as an important market segment in its own right allied to air travellers outlined above.

APPENDIX A: Technical matters

In establishing a simplified data-set on which sensitivity analysis (principally concerning alternative usages of saved time in the off-peak), could be undertaken, a careful check was made to ensure that only those records were included that were valid. That is, they each had to contain valid responses for:

- the percentage of travellers who did not work on the train at all (which depended on the validity of estimates of the time or percentage of journey-time spent working);
- the factor by which an change in on-train working time needed to be multiplied in order to provide a value appropriate to the normal place of work (which depended upon the estimates of both the amount of time spent working on the train and on how much longer the same work would have taken at the normal place of work);
- the effect of a reduction in journey time on the time spent working on train and the magnitude of that effect;
- whether or not the time saved by a journey-time reduction would be used for work (off-train). (The magnitude of any such use was assumed to be the maximum available, namely the amount by which the journey-time was reduced); and
- the personal income of the traveller.

As well as excluding records by reason of the invalidity (or absence of data) in a particular field records were also excluded to avoid inconsistencies across different fields (for a detailed description of that process for the main study, see Appendix of C the main report).

As a result, data set for these analyses was reduced from the original 1,660 records to 1,178 records. It was found that the number of these valid records were slightly more than those that had contributed to the Employers' estimate of the Value of Time savings (the "EMR" values) in Table 8.9 of the main study report. The increase in the number of valid records did not however change by very much the overall average value of EMR from the figure (£4.40/hr) given in that Table, though some of the estimates for various cells of that table did change more substantially. Some of the tables in Chapter 6 of the main report, which

provided an input to Chapter 8 of the same report, would also be affected by the slight increase in the number of valid records.

The intention in this short study had been to undertake the sensitivity analysis on grouped data. The robustness of the average estimate of the EMR obtained by such a method therefore depended upon the extent to which the product of the means of two variables would be an adequate estimator of the mean of the products of the two variables. Although for the first two scenarios tested this was the case, for another it was not, and it was concluded that the sensitivity analysis was best undertaken at the level of the individual respondents, as was done for the main report using the PILT variable in SPSS. In order to make it easy to change the data for each individual, the analysis was carried out in Excel rather than SPSS. As Pivot Tables do not provide for the calculation of weighted averages as a standard function, a special technique was used to enable that to be done.

APPENDIX B: Supplementary information

This Appendix summarises salient information relevant to Scenarios 1-5. To re-cap, these were such that:

- Scenario 1 assumed that there was no on-train loss of working time and that all saved time goes back to work off-train (the current WebTAG convention);
- Scenario 2 used survey data on the on-train loss of working time, but assumes all saved time goes back to work off-train (i.e. 100% productive);
- Scenario 3 used survey data on the on-train loss of working time; used survey data on the off-train use of saved time (for work or leisure) for home-based trips, but assumes all saved time goes back to work for other (non-home-based) trips;
- Scenario 4 used survey data on the on-train loss of working time; the off-train use of saved time differentiates between trips returning home (for which survey data is used); outward trips from the home (for which the relative use of saved time is assumed to be 50%, presuming that half the journey time reduction means a later start from home and half mean an earlier arrival at the work-place); and other (non-home-based) trips (assumed to be 100% productive); and
- Scenario 5 is the short-run situation, with levels of in-train working and proportions of saved time returned to work as in the SPURT survey.

Note that the data presented below may differ slightly from values presented in the Main Report due to differences in the sample count (and consequential changes in weights of the expanded data).

Basic data

The basic data common to Scenarios 1, 2 and 5 had the pattern of sample counts and weighted percentages of expanded data shown in Tables B1 and B2.

Table B.1 – Sample counts contributing to the analysis

Scenario	On train work profile			Overall
	Did not work on train	Work on train unaffected by JT reduction	Work on train lessened by JT reduction	
Q35 Summary Work or not in saved time	Mean	Mean	Mean	Mean
Not worked	182	385	138	705
Worked off-train somewhere	23	226	224	473
Total	205	611	362	1178

Table B.2 – Percentage distribution of expanded data

Scenario	On train work profile			Overall
	Did not work on train	Work on train unaffected by JT reduction	Work on train lessened by JT reduction	
Q35 Summary Work or not in saved time	Mean	Mean	Mean	Mean
Not worked	20.1%	25.5%	13.0%	58.6%
Worked off-train somewhere	2.5%	15.8%	23.1%	41.4%
Total	22.6%	41.3%	36.1%	100.0%

For Scenarios 3 and 4 a further 13 records were excluded as location information was not stated.

Productivity relative to the office

For Scenarios 2-5, the productivity of work being done on the train relative to the work place, averaged across all those who worked on the train, was 0.999. That is, the work done on-train would take only very slightly less time if the work was done at the office. Table B3 shows an interesting difference in relative productivity between those whose work on-train was unaffected and those whose work was affected by the journey time reduction.

Table B.3 – Some contrasts in the productivity of on-train work relative to the office

Scenario	Did not work on train	On train work profile		Overall
		Work on train unaffected by JT reduction	Work on train lessened by JT reduction	
Q35_Summary Work or not in saved time	Mean	Mean	Mean	Mean
Not worked	n/a	0.995	1.138	1.043
Worked off-train somewhere	n/a	0.938	0.967	0.956
Total	n/a	0.973	1.029	0.999

Sample count (those who work on the train) = 973

Purpose distributions

For Scenarios 3 and 4, the proportions of home-based trips are given (as for Scenario 4) in Table B4. (That for Scenario 3 is the sum of the ToHome and OHB columns).

Table B.4 – Scenario 4: Percentage distribution by origin/destination location

Scenario	ToHomeOrNot 3 purposes			Total
	ToHome = to home from work or other	OHB = other home-based trips	NHB = non-home-based trips	
Q35_Summary Work or not in saved time	Row N %	Row N %	Row N %	Row N %
Not worked	34.8%	32.8%	32.4%	100.0%
Worked off-train somewhere	20.8%	48.7%	30.4%	100.0%
Total	29.1%	39.4%	31.6%	100.0%

Proportion of time savings returned to work. The proportion of time savings (over all trips) that is returned to work time (off-train) is as follows for each Scenario:

- Scenario 1 = 1.000
- Scenario 2 = 1.000
- Scenario 3 = 0.603
- Scenario 4 = 0.598
- Scenario 5 = 0.414