Values of Travel Time Savings in the UK – Summary Report

Report to Department for Transport


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Institute for Transport Studies, University of Leeds in association with John Bates Services

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VALUES OF TRAVEL TIME SAVINGS IN THE UK – SUMMARY AND CONCLUSIONS


I Introduction

1 A brief history of the value of travel time savings (VTTS) in the UK may be a useful background to this report. In the 1960s, early cost benefit analysis work, such as that for the M1 study and the Victoria Line study utilised the wage rate theory of the valuation of time savings for travel during employers business, but found no theoretical basis for deriving non-work time values from the wage rate or any other observable data. This led to work which tried to infer values from people’s revealed travel choice behaviour (RP).

2 Hand in hand with this went the development of the concept of “generalised cost”, for which the *locus classicus* is the Department’s MAU Note 179 (McIntosh & Quarmby, 1970). With hindsight, this can be seen as an early version of the “indirect utility” specification of discrete choice models, in which different attributes of a given travel alternative are combined (usually in a linear form) with “weights”. In this form, the VTTS is the ratio of the weights on time and money.

3 MAU Note 179 drew a fundamental distinction between the weights used for modelling and those used for evaluation. Conceptually, there is little difficulty with modelling; weights are needed which best reflect the behaviour of the individuals who make up the relevant market, and should be based on the assessed willingness to pay for travel time and other journey attributes. For evaluation, however, other considerations were held to apply.

4 The willingness to pay to save travel time varies with income, among other things. During the ministerial reign of Barbara Castle towards the end of the 1960s, a decision was made that for all publicly funded projects, a single ‘equity’ value (later renamed ‘standard’ value) of non-working time would be used to value in-vehicle time savings for all locations, modes, incomes and non-work journey purposes :

“The equity value of time is based on the average income of travellers on the journey to work and is updated using the growth in disposable income per head of population.....it is assumed to hold for all individuals on all forms of non-work journeys” (Nichols, 1975)

5 Based on the work carried out for the then Ministry of Transport, walking and waiting time was valued at twice in-vehicle time, and the standard value was set at 25 per cent of the average gross of tax wage rate. As a result the standard value was assumed to grow proportionately with the forecast growth in income. Appropriate corrections were recommended (MAU Note 179, p 25) to convert to *household* income, so that the value of adult time in the household was assumed to be 19% of Gross household income, assumed over a 2000 hour working year.

6 This first wave of work on the value of travel time ended in the early 1970s, and the official position was then stable for about a decade.
In the early 1980s, the Department decided that a review of VTTS was necessary. This was in part due to the passage of time, but there was also a concern that the non-working time values were derived predominantly from commuting evidence in towns, while much of the road programme was primarily interurban. In addition, there had been substantial developments in computing capacity and analytical techniques had improved with the development of the discrete choice “paradigm”.

At an early stage in this second wave of work, it became clear that despite the interest in exploring choices away from the “traditional” journey-to-work context, it would be very difficult, and expensive, to find suitable locations where genuine choices could be “revealed” and the statistical data properties necessary for successful estimation of VTTS guaranteed. The study therefore recommended that Stated Preference (SP) methods should be investigated, and on the basis of empirical data developed a sufficient case for compatibility between SP and the conventional RP approach that official confidence in SP was established. Since then, SP methods have become the “norm” for VTTS estimation, though there is still a tendency to supplement the data collection with RP data, where a suitable context can be found.

The headline outcome of this work, which led to the MVA/ITS/TSU report of 1987 and the official paper which followed (DoT, 1987) was that the Department’s philosophy of evaluation, including the standard value of non-working time, was retained intact, but the standard value itself was increased by 58 per cent to 43 per cent of the average hourly earnings of full time adult employees, which was equivalent to 40 per cent of the mileage weighted hourly earnings of commuters. Modifiers were introduced for socio-economic status (e.g. retired persons) where the evidence showed that, all else equal, values differed systematically. However it is our impression that these modifiers are rarely used in practice. For travel on employers business, the traditional ‘cost saving’ approach was retained, with recommended values for categories such as bus and coach drivers, commercial vehicle drivers and car drivers on employers business. This 1987 paper is the source of the official values used today rebased for price changes and updated for changes in real incomes most recently in the Transport Economics Note (DETR, 2001).

In 1994, the Department commissioned a further study of the valuation of travel time savings on UK roads, which was conducted by a consortium of Accent Marketing and Research and the Hague Consulting Group (AHCG). A major international seminar was held in 1996 to discuss the findings of this work (PTRC 1996). The AHCG report was published in 1999 together with several reviews (AHCG, 1999).

It is fair to say that the Department has found it difficult to decide how best to implement the recommendations of the AHCG report and the situation was noted in the 1999 SACTRA report. This is the backdrop to the work which is reported here.

Thus we can summarise current practice in Table 1.
### Table 1 – Current Basis for UK Values of Time in Modelling and Appraisal

**Modelling**

<table>
<thead>
<tr>
<th>Employers business</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>behavioural values</td>
<td>behavioural values</td>
</tr>
</tbody>
</table>

**Evaluation**

<table>
<thead>
<tr>
<th>Employers business</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>cost saving approach</td>
<td>standard average value</td>
</tr>
<tr>
<td>2 x standard</td>
<td></td>
</tr>
</tbody>
</table>

**variations by**

<table>
<thead>
<tr>
<th>commuting/leisure?</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>journey length?</td>
<td>no</td>
</tr>
<tr>
<td>sign and size of saving?</td>
<td>no</td>
</tr>
<tr>
<td>mode?</td>
<td>no</td>
</tr>
<tr>
<td>income?</td>
<td>no</td>
</tr>
<tr>
<td>socio-economic status?</td>
<td>yes (rarely implemented)</td>
</tr>
<tr>
<td>growth over time?</td>
<td>unit income elastic</td>
</tr>
</tbody>
</table>

The purpose of this work has been to review the evidence, relevant principles, and practical considerations, and to make recommendations for change where this is considered to be justified. We have undertaken a reanalysis of the AHCG data, and conducted a meta-analysis drawing on evidence from many other market research studies.

This summary report relies on a number of supporting documents. The main one is the Technical Report, available as ITS Working Paper 567. At a more detailed level still are Working Papers produced during the course of the work on key topics. These are:


In autumn 2001 Dr Denvil Coombe was commissioned to consider the feasibility of implementing the findings from the evidence. A seminar for experts was held at the Department in December 2001, and Dr Coombe's report has been submitted to the Department.

The structure of this paper is as follows. In section 2, we consider employers business travel and freight. In section 3, we summarise the main findings on the value of travel time savings for non-work purposes. In section 4, we report the evidence relating to the growth rate of the value of time savings over time. In section 5, we consider, given the evidence, the principles and practical issues involved in change. In section 6, we summarise our conclusions and present recommended values for appraisal.
2. **The Value of Travel time Savings – Employers’ Business**

The Government’s approach to deriving the VTTS for employers’ business purposes has been to follow the wage rate or cost savings approach. That is to say, the value of a travel time saving is assumed equal to the wage rate, including labour-related overheads, of the relevant class of labour. This is presented in the TEN as a series of standard values.

Because the average value of employers’ business time is of the order of four times the average value of non-working time, roughly half of the travel time benefits are accounted for by employers’ business time savings even though this is only one sixth of car traffic. Irrespective of what follows, it is therefore important that the Department maintains appropriate average values either for all travellers on employers business or for relevant sub-categories. This requires knowledge of the pattern of use of the roads and transport network for employers business purpose.

Another approach, due to Hensher (1977), seeks to modify the cost savings approach by allowing for various factors which might reasonably be expected to affect the value. The approach distinguishes between the value of the time saving to the employer and to the employee, and considers:

- the proportion of travel time savings which go into leisure rather than additional work
- the proportion of travel time saved at the expense of work done while travelling
- the productivity of work done while travelling relative to at the workplace

This approach does not avoid the need to apply the marginal productivity theory which underpins the cost saving approach; rather, it elaborates it.

We consider that:

- there is a great deal of uncertainty about the ‘true’ values of the modifying parameters in the Hensher model, despite the effect put in to devising suitable questions and about the representativeness of the sample to which they have been applied.
- there is doubt in any case about whether changes in the onerous nature of working conditions, including travel time on employers business, are not anyway, in the medium term reflected in employee remuneration, i.e. through wage flexibility.
- the results from this approach using different assumptions straddle the values found from the cost saving approach.

We conclude that for professional drivers such as bus and freight transport drivers and attendants, there is a strong justification of principle for retaining the ‘cost saving’ approach. For briefcase travellers, the position is more arguable, but given the uncertainties, we see no strong case for abandoning the cost saving approach here either. It is currently assumed in appraisal that the vehicle occupancy for goods vehicles is unity. The Department should check the validity of this assumption possibly via a special question in the Continuing Survey of Road Goods Transport, and should keep under review the average gross wage rates and labour-related overheads used to derive values of time for travellers on employers business.
3. The Valuation of Non-Working Time - Evidence

Our approach to this is to draw as far as possible on the AHCG evidence for car users. The AHCG study was a purpose built study commissioned by the Department and subject to international peer review. The meta-analysis is used as a cross-check, and also to provide evidence in areas such as public transport and ‘out of vehicle’ values which are not covered by the AHCG report. We consider the evidence for variations in the value of travel time by sign and size of time saving, journey purpose, income, journey length, mode and socio-economic status.

We have conducted an in-depth analysis of the possible variations in the VTTS by sign and size of time savings. We conclude that there is no significant evidence of variation in the VTTS with respect to the sign of the time change.

There is no doubt that the AHCG dataset strongly indicates lower values per minute for small time changes than large. There is nothing apparently illogical in the data or the design to produce such an outcome, nor is it an artefact of the model specification. However, a careful analysis of the data implies very low VTTS for small time changes (5 minutes or less), and a rather high marginal VTTS for the next 5 minutes or so, before falling to a more moderate value for larger time savings. This pattern is inconsistent with axioms of consumer preference and is, we believe, unreliable. A fuller discussion is in the TR and WP 561.

We conclude that there must be doubt as to whether SP is a suitable vehicle for carrying out the investigation of response to small time changes. Consequently interpretation of these results, and implications for policy, must rely on judgement against all the evidence and relevant theory.

Against that background, our preferred interpretation of the results is one in which time changes of 10 minutes or less are “downweighted” by the respondent. This might be because a degree of uncertainty is attached to small changes and/or because of the short-term context within which SP choice games tend to be conducted. Our approach therefore is to use a ‘perception’ mechanism which puts different weights on the number of minutes saved for each value in the range 0 to +11 minutes. This has the effect of smoothing the results and deals with the inconsistency with theory noted in para 24 above.

The issue of the valuation of small time changes has always been a difficult one, and these difficulties have not been resolved. This is not because of inadequacies in the research design. We recognise that the Department remains in the position of basing its values for the small time changes, which are characteristic of many schemes and policies, on extrapolation from the values found for larger time savings. This is less than ideal, but we believe that, considering both theory and evidence, a constant value per minute is more defensible than any alternative. We recommend, both for evaluation and for modelling, that the hypothesis of a lower than average or zero value of small time changes should be rejected.

Having defined our preferred approach to the sign and size of the time savings questions, we then analysed the sources of variation in the VTTS using the AHCG data and the meta analysis of past studies. From the reanalysis of the AHCG data, the principal findings are:-

- the chief source of variation in VTTS for car users are income and factors relating to journey length.
- the VTTS for commuting is slightly higher than for other non-work purposes
VTTS is lower for retired persons, other things equal.
VTTS appears to be about 20 per cent lower for passengers than for drivers; this is plausible, but we have concerns about the data definitions on which this result is based.
the results for other determinants do not display sufficient consistency and strength to justify modifying for these.

The key results from the meta-analysis, as they relate to car travel are that the VTTS varies with distance, income (GDP), journey purpose, the numeraire used to derive the value of time, and a London and South East factor.

Comparing the results of the two studies there is a fair degree of similarity in the level and pattern of VTTS in the AHCG and meta-analysis data. Putting them together with other evidence, the conclusions in which we have greatest confidence are:

- fairly similar values of time for Commuting and Other; in both cases Commuting is slightly higher than Other at most distances or costs;
- significantly lower values for retired persons, other things equal;
- significant variation in VTTS by income and journey length which require further exposition.

The variation of the VTTS with income is expected on theoretical grounds; indeed some relationship whereby value of time increases with income has been found in all major value of time studies. In our preferred constant elasticity model specification of the AHCG data set, the income elasticities were +0.36 for Commuting and +0.16 for Other, both with respect to household income. We note that the values estimated by AHCG for income elasticity were significantly higher at +0.65 for Commuting and +0.35 for Other. The difference is due partly to model specification and partly to the choice of points for calculation of elasticities. The meta-analysis provides a time series elasticity of +0.72 for GDP per head for all data and +0.82 for in-vehicle time data with wide confidence intervals.

There are reasonable grounds for expecting to find a relationship between VTTS and journey length. These include increasing marginal disutility of travel time with journey length, greater significance of time constraints in longer distance journeys and differences in the trip purpose mix at long, relative to short distances. Previous studies such as the Swedish and Norwegian value of time studies have found such a relationship.

There is an issue of how journey length is to be represented in the model. Candidates include time, distance, cost, or some combination, and their respective merits were debated at the December 2001 seminar. Although on behavioural grounds we might prefer time or cost, we believe it is essential to tie the values derived from the sample to secure evidence on the pattern of journey lengths such as the National Travel Survey, where the measure of journey length is distance. Since AHCG did not collect distance, we developed a method of imputing distance from their cost data.

The elasticities of VTTS with distance are found to be +0.26 in the meta-analysis and (on average) +0.37 in the AHCG data. So there is clear evidence of a distance effect, which is of relevance for behavioural modelling. Unfortunately however, in our modelling work based on the AHCG data, this effect comes about not through increasing marginal disutility of time with
journey length, but through falling marginal disutility of cost as journey length increases. This can be interpreted as...‘the disutility of spending an additional pound is less when the absolute price is higher’. The relativity effect contradicts economic rationality, since a pound equals a pound regardless of how it is acquired or saved. However this phenomenon has behavioural plausibility and is confirmed in other value of time studies. The recommendation for evaluation, as distinct from modelling, is therefore a difficult one. We believe there are two main options for the Department:-

- to rely on the evidence as a whole, including the meta-analysis, to accept a distance elasticity – say +0.3 – as being relevant for evaluation, and to implement this using a few distance bands;
- to use the best estimates of the income and distance elasticities to compute the average values of time but not to differentiate VTTS by distance in evaluation.

In favour of the first option is the argument for consistency between values used in modelling and values used in evaluation. But we attach considerable weight, in the evaluation context, to consistency with neoclassical microeconomics which is the foundation of cost benefit analysis. On balance, therefore, we recommend the second option.

Comparing the official standard average value with the overall average values implied by the analysis of the AHCG dataset and the meta-analysis is also not straightforward, because the VTTS varies with income and distance. However, using NTS data to carry out a re-weighting and making what we consider to be reasonable assumptions (see TR), we obtain mileage-weighted figures as follows, in pence per minute at end 1997 prices.

<table>
<thead>
<tr>
<th></th>
<th>AHCG</th>
<th>Meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuting</td>
<td>6.58</td>
<td>5.93</td>
</tr>
<tr>
<td>Other</td>
<td>5.88</td>
<td>6.20</td>
</tr>
</tbody>
</table>

While all the values show a similar order of magnitude, these model-based values are nearer to what the official value would be without allowing for income growth from 1985 to 1997 (6.2 pence/min) than to the actual official value based on full proportionality between income and the VTTS (7.3 pence/min).

Our conclusions are as follows

- there is no implication that the official VTTS is seriously out of line with the available evidence from the AHCG study and the meta-analysis.
- our inclination is to prefer the AHCG based values, at least for car users. For commuters, the value is intermediate between the no income growth and full income growth estimates from TEN. It is probably also the case that the conclusions of the 1985 study were dominated by the commuting purpose, and that the AHCG work provides valuable new evidence on the other purposes.

Turning to public transport, from the meta-analysis dataset, we have derived values of in-vehicle time which distinguish between user type and mode. Two main results emerged:-

- for a given set of individuals, the value of travel time savings varies across modes. Relative to the VTTS for car, car users have a higher VTTS for bus and a lower VTTS for rail.
• average VTTS on bus, rail and car vary because of the different socio and income composition of the traffic on the modes and the different journey length distributions. Rail and car are generally similar, with bus at about half the values of the other modes.

37 If, as suggested below, the appraisal is segmented by socio and income characteristics, the effect in the second bullet point will already have been picked up. It is not the mode per se, but the income, socio and journey length characteristics of the traffic carried on local buses, which causes the average outturn VTTS on bus to be low. We would therefore prefer to see this handled as a person-type effect rather than as a modal effect.

38 The first bullet point however, we regard as a comfort or quality effect. This might be decomposed into various attributes such as reliability, ride quality, chance of a seat, crowding, information etc. We would like to see these quality characteristics incorporated into generalised cost modelling and evaluation.

39 We conclude that:

• There is some evidence that individuals value non-working time savings on the bus mode more highly than for car, and these in turn more highly than travel time savings by rail, other things being equal.

• This appears to be true equally for commuting and leisure.

• We interpret these differences as reflecting differences in comfort, cleanliness, information and other characteristics of spending time on each mode. In principle, we think it is consistent with UK public sector appraisal conventions to move towards a differentiated ‘value of time’ by mode, inasmuch as they reflect users’ valuations of these differences.

• Evidence also indicates that when aggregating across individuals to the level of ‘user types’, a reverse pattern is found. Bus users have the lowest value of time savings, followed by car and rail. This pattern is likely to be due to some combination of income differences between the ‘user types’, differences in journey lengths between modes, and self-selectivity - individuals migrating to modes whose characteristics suit their own.

• Although we see no theoretical objections to allowing modal values of time to vary for the same individual to reflect comfort etc. valuations in transport appraisal, we think that more work is needed to identify statistically robust values. We would prefer to see these values tied to specific attributes rather than to time.

• We also think that work is justified to define, quantify and value the modal characteristics involved.

40 The analysis of out of vehicle time suggests that relative to the VTTS, a weight of two for the value of walk time is reasonable, but the evidence would justify a higher weight varying by mode and distance on waiting time. An overall average of two and a half times rather than twice the VTTS would be more consistent with our evidence.
We conclude this section by comparing our conclusions with current practice. With varying degrees of strength, we believe that current UK VTTS practice is supported as it relates to the treatment of:

- employers business and freight
- sign and size of time savings
- walk time relative to in-vehicle time

However, we find that VTTS does vary with

- income
- journey length
- commuting versus other non-work purposes
- retired status
- modal quality attributes

and that waiting time justifies a weight on average of two and a half rather than two relative to in-vehicle time. We conclude that these sources of variation should be taken into account in modelling work, subject to practicalities.

4. The value of time over time

The Department's assumption for evaluation has been that VTTS increases proportionately with income, that is, VTTS is assumed unit income elastic. Given our conclusions on the value of working time savings (para 21 above), we endorse the continued use of the unit income elasticity assumption for working time.

For non-working time, we have investigated this using a variety of sources (see WP 566). We place some confidence in the time series evidence from the meta-analysis because this yields direct evidence from studies conducted at different points in time as to how VTTS varies over time. The estimated GDP per head elasticities and 95% confidence intervals were +0.72 (+43%) for all data and +0.82 (+40%) for in-vehicle time data. However, average trip distances are increasing by 2.2 per cent per annum and this too affects the VTTS. Allowing in addition for the effect of increases in trip length over time, adds a small amount (+0.03 to +0.08) to the above elasticities. However, the proportion of this journey length effect which is due to GDP growth as opposed to other trends such as the falling real cost of motoring is not clear. Any chosen intertemporal elasticity is likely to be a mixture of a ‘pure’ income effect and other trends over time which cannot easily be separated.

We conclude that the evidence as a whole tends to support an intertemporal elasticity for non-working time of somewhat less than unity, probably in the range 0.5 to 1. We recommend a move from the current unit value to a value of 0.8.

The implication is that we envisage the value of business travel time and of non-work time will move apart over time, but at a relatively gentle rate. We have considered the implications of allowing the employers’ business value to grow with a unit elasticity while applying a lower elasticity to non-working time. From a theoretical point of view, we see no fundamental reason why the relative values of work and non-work time should remain constant. Variations might occur for several reasons including the following.
Firstly, the marginal value of time spent travelling might change because of changes in the disutility of travel. This relates both to the conditions of travel (broadly ‘comfort’) and to the possibility of undertaking other activities while travelling – mobiles, lap-tops, in-car entertainment systems etc.

Secondly, there may be changes in the ‘resource value of time’ due to changes in income, changes in working hours and changes in the relative utility of time spent working and in leisure. The last factor could reflect for example, more pleasant working conditions and increased opportunities for leisure.

These arguments are not capable of direct empirical validation, but they lead us to conclude that there is no overriding reason of principle why the values of time for employers’ business and for other purposes must move together over time at the same rate.

5. Considerations of principle and practicality

It is one thing to say what the evidence is for the variation in the VTTS with respect to economic, social and trip characteristics. It is another to make recommendations for the application of this evidence in modelling and appraisal practice. There may be reasons of principle for overriding or moderating what the evidence says. Also there may be relevant practical issues – considerations of data collection, cost-effectiveness, auditing and control of the appraisal process impinge on what can be recommended. These considerations may vary according to circumstances – good practice in the context of a very significant scheme or policy intervention may differ from what is required for routine scheme appraisal or comparison between scheme options. Decision contexts such as tolling or road pricing may place particular requirements on the analysis.

The conclusions in para 42 which relate to differentiating between commuting/other, retired status and waiting time do not in our view raise new issues of principle for the Department. However, the conclusion that VTTS varies with income and journey length does raise an issue of principle, namely whether or not the standard value of non-working time should be retained.

The standard value is a concept which relates primarily to benefit evaluation rather than to modelling, but a few words on modelling and forecasting are in order as a preliminary.

For modelling and forecasting, there is no particular controversy of principle – forecasts should be based on the best predictions of human behaviour and therefore the best available evidence of willingness to pay for time savings in different situations is needed (i.e. market based values). However, it is worth noting that the Department's recommended behavioural values in HEN2 and now the TEN are system-wide averages. It would be difficult to argue in principle against the use of context or locally specific market values for modelling and forecasting and the TEN makes provision for this. The fact that system averages rather than local values are widely used implies that obtaining local values has been regarded as not cost-effective and/or difficult to control/audit. This has resonance for what we say later about evaluation values.

Turning to the context of evaluation, the use of a standard value of non-working time savings has been UK practice since the 1960’s. This standard value is the mileage-weighted average value of non-working time savings of traveller. There are two arguments for the standard value:-

- that in principle, the same values for non-working time savings in all locations and modes should be applied irrespective of the willingness to pay of the particular group of consumers who get the benefits;
that using a single standard value is a practical procedure to follow given the difficulty of acquiring relevant market information (incomes etc.) on which case specific values would need to be based.

Robert Sugden’s paper for the Department called for an end to the use of the standard value of non-working time on the grounds that it is “incompatible with the logic of CBA” (Sugden, 1999). This is an important recommendation from a wide-ranging paper, most parts of which are accepted by both us and the Department. We have to agree with Sugden that there is an inherent inconsistency in the traditional approach.

The inconsistency arises because, whereas the money costs and benefits of schemes (plus in principle, the working time benefit) are valued at unadjusted market values, the non-working time benefits and safety benefits are adjusted by the use of a standard value. So, a poor person who gains a money cost saving of 5 pence is allocated a benefit of 5 pence. However, if the same person gains one minute time saving which they value at 2 pence, that is valued at the standard value of, say 5 pence. As Pearce and Nash point out:-

‘This inconsistency could lead to misallocation of resources; for instance a scheme which gives the poor time savings at an increased money cost of travel could be selected in circumstances in which they would rather forgo the time savings for the sake of cheaper travel’.

(Pearce and Nash, 1981, p182)

A similar example (from the opposite end of the income spectrum) is given by Sugden [para 7.2].

We conclude that

- the standard value of non-working time is an incomplete approach to social weighting in cost-benefit analysis and introduces problems of inconsistency of treatment between time and costs;
- specifically, the relativities between time and costs are different in modelling and evaluation, and this introduces problems where users are paying for benefits through fares or charges
- the standard value relies on the strong assumption of equal marginal utility of time across groups.

In an ideal world, we believe that appraisal should

- discover the willingness to pay for all the costs and benefits accruing to all relevant income groups.
- use those values consistently in modelling and evaluation.
- re-weight the cost and benefits according to some social weighting scheme which is common across all impacts. There is no particular reason to expect that the outcome would be a single standard social value of time.

In such an ideal context, the argument of principle for the standard value of time falls.

However, we regard a full distributive weighting approach to appraisal as very ambitious for most transport applications, considering the following difficulties:

- obtaining the relevant data on the pattern of usage by income and social group at the scheme level.
• defining the final incidence of costs and benefits to income and social groups – especially difficult for working time, including freight, and for revenue effects;
• treating the non-monetised elements in the appraisal consistently with the monetised ones within the social weighting scheme;
• agreeing the set of social weights.

Implementing a full social weighting scheme for transport sector appraisal is likely to be challenging. Therefore on pragmatic grounds, we would recommend falling back on the use of a set of standard values of non-working time for most scheme appraisal work. We regard this as a practical second best in an appraisal regime which contains many standard parameters. We believe this conclusion is consistent with the approach taken in the draft Green Book.

However, because we are relying on pragmatism rather than principle, we accept that there are circumstances where the disadvantages of using the standard value outweigh the advantages. These are primarily quasi-commercial appraisals such as rail investment, toll roads, major policy initiatives such as road user charging. It is in these applications that the problems of inconsistency in modelling and evaluation are most serious.

A seminar was held at the Department in December 2001, attended by consultants, academics and practitioners. The purpose of the seminar was to discuss the practical feasibility of implementing the conclusions arrived at on the basis of theory and evidence. The seminar was moderated by Dr Denvil Coombe whose report the Department has.

Dr Coombe's conclusions were that it would be practical to increase the number of user classes or segments used in modelling and appraisal so as to allow, for example, for income, distance and purpose classes. However, Coombe drew attention to the scope for bias to creep into appraisals where entirely locally determined values of time were used, with implications for audit requirements.

Considering both the issues of principle and of practice, we think the Department should consider moving to a more varied set of appraisal options as set out below:-

**Level 1 – routine appraisal work**

For much routine appraisal work, including the evaluation of small to medium sized schemes and particularly for the choice between scheme options, there is a great deal to be said for a relatively simple standard values approach to both modelling and evaluation. Much appraisal work should in practice continue to rely on standard values of the kind set out in the TEN. The benefits of a standard approach outweigh the costs of creating and auditing special values for every context.

**Level 2 – major schemes and strategies**

We have found that the value of non-work travel time savings varies with a number of factors such as income, journey length and retired status. For strategic modelling including major schemes such as motorway widening, we recommend the use of a more differentiated set of behavioural values than for level one. Use of scheme-specific data on income, journey length, retired status etc would need to be authorised on the basis that the local data would be auditable.

A set of default values and relationships could be derived from our recommended model. On the evaluation side, we have established in paras 58 and 59 above the issues of principle and practice which are at stake. In principle, we recommend moving away from the single average value of
time to a set of income-related values. However, implementing this recommendation requires progress to be made in the treatment of distributional effects. Ideally, we would like to see a full distributive analysis, but, as noted in para 59, this is likely to be challenging. In the absence of substantial progress in this direction, we feel that the following is the minimum acceptable:

- in the first place, a level 1 approach should still be carried out, as a benchmark
- any level 2 disaggregation by income should present the distribution of benefits separately for the three income levels distinguished
- as far as practical, the distributional implications of any increase in the overall benefits consequent on the move from level 1 values to level 2 values should be clearly indicated

**Level 3 – special applications**

There are various situations for which standard behavioural values are not considered adequate for modelling, and it is necessary to segment the market into various sub-components with different willingness to pay characteristics. Classic examples are contexts which involve varying mixes of time and cost in the choice set – toll roads, cordon pricing, LRT v buses – where such market segmentation is essential. In such cases, it will be likely that bespoke Stated Preference exercises will be conducted in order to elicit context specific values. This is already done for modelling purposes and for the commercial evaluation of projects. Again, subject to auditability and to verification against the standard values, we would be willing to recommend the use of these values in evaluation as well as in modelling. On balance, we think the advantages of using behavioural values throughout the appraisal in cases where a significant proportion of consumer surplus is being converted into producer surplus through tolls or charges outweigh the disadvantages of inconsistency in the appraisal of free versus tolled facilities. Clearly the balance of advantage is context – dependent, and we would expect the Department and its agencies to give advice and guidance to consultants. For level 3 evaluations, both the level 2 and level 1 results should be presented as benchmarks.

6. **Summary of main conclusions and recommended values**

With regard to employers business and freight transport:

**R1**  
for professional drivers such as bus and freight transport drivers and attendants, the cost saving approach should be retained.

**R2**  
for other travellers on employers business such as ‘briefcase travellers’, there remains a great deal of uncertainty regarding the true values of the factors the Hensher Model and about the labour market assumptions which are relevant when working conditions change. Given this, there is no strong case for abandoning the cost saving approach to valuing savings in travel time on employers business.

**R3**  
we recommend that because of the importance of working time savings in the total, the income characteristics of travellers on employers business, the occupancy rates of vehicles and other inputs which affect the recommended values should be kept under review.

The rest of our recommendations relate to non–working time. There is evidence that values of travel time savings vary with income, journey length, journey purpose, mode, driver/passenger, and retired status.
there is no sound basis for differentiating values of travel time savings in terms of their sign or size either for car or public transport applications;  

for *journey purpose*, the evidence is that the value of travel time savings for Other purposes is 10 per cent below that for Commuting. This is a fairly robust conclusion; it is for the Department to decide whether this is worth implementing in the various evaluation contexts. In the values given below, we assume that it is worth doing so;  

for *mode*, we are only interested in variations in the valuation of travel time savings due to innate modal quality differences. There is evidence that for car users, VTTS on bus is higher than that for car, which in turn is higher than that for rail. However, it is not statistically robust, and we think it will be more useful if related to specific attributes such as comfort, cleanliness, information etc. For the moment we do not recommend differentiating VTTS by mode. We do offer further evidence on out of vehicle time – walk, wait and headway. We recommend that wait time values should be increased to two and a half times in-vehicle time with walk time values remaining at twice in-vehicle time.;  

the results from our analysis of the AHCG data suggest the value of travel time savings for passengers is on average some 20 per cent below that for drivers. However, for reasons given in the Technical Report, we are not completely convinced of the validity of this result and do not recommend its implementation;  

the results show that the value of travel time savings for retired persons is significantly lower, by the order of 25 per cent, all else equal, than for economically active persons. Following the 1987 Report which found a similar result, the Department issued a number of ‘socio economic status’ modifiers to the standard value of time. Our impression is that these have rarely been used in practical appraisal work. The issue is essentially whether and in what circumstances data on the retired proportion can be obtained for network modelling and evaluation work. We emphasise that the values given below are averages which include the retired in the calculations;  

we find that the valuation of travel time savings varies significantly with income and with journey length, and recommend that this variation should be reflected in behavioural modelling work. However, from an evaluation perspective, we have some reservations about the consistency of the results with microeconomic theory. On balance we are inclined against differentiating VTTS by journey length on this evidence. Accordingly, we recommend using the best estimates of the income and distance elasticities to compute the average values of time, but not to differentiate by distance in evaluation. This is a priority for further work, since variations by distance could affect the relative worth of schemes significantly.  

the evidence as a whole tends to support intertemporal elasticities for non-working time of somewhat less than unity, probably in the range $+0.5$ to $+1$. We recommend a move from the current unit value to a value of $+0.8$, and that this should be used to uprate the values below from end 1997 to current values.
we think it would be consistent with the recommendations of the draft Green Book to adopt a degree of flexibility in the valuation of travel time savings in evaluation and we suggest that the single standard value might be replaced by a three-level approach.

for level 1 appraisals, we recommend that the VTTS by income band recommended in R13 below should be weighted using a standard distribution of incomes and journey lengths. Using NTS 1995-2000 data, this gives the following average VTTS (mileage-weighted) at end 1997 prices for all non-business trips and all mechanised modes:-

<table>
<thead>
<tr>
<th></th>
<th>Commuting</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>All modes</td>
<td>6.6</td>
<td>5.9</td>
</tr>
</tbody>
</table>

Compared with the values currently in use, these represent a 10 per cent fall in the Commuting value and a 20 per cent fall in the Other value at the base year (1997).

For level 2 appraisals we recommend that more detailed account should be taken of the variation in VTTS by income band. Applying the coefficients in our preferred model to the pattern of incomes and journey length in the NTS 1995 – 2000, we derive the following weighted average VTTS by income band, again at end 1997 prices and values:-

<table>
<thead>
<tr>
<th>Income Band</th>
<th>Commuting (p/min)</th>
<th>Other (p/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below £17,500 pa</td>
<td>3.6</td>
<td>4.6</td>
</tr>
<tr>
<td>£17,500 – 35,000 pa</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td>Above £35,000 pa</td>
<td>8.6</td>
<td>7.1</td>
</tr>
</tbody>
</table>

For level 3 appraisals such as the evaluation of toll roads, user charging schemes, metros and other 'user pays' facilities, the Department would rely on specific market research exercises. However, we strongly recommend that these be explicitly benchmarked against more general evidence, including the level 2 values above and other data from this study, and that they be subject to quality control.

We recommend further targeted research on the following issues:-

- variation in the marginal utility of time and cost with respect to the levels of time and cost, so as to provide a more secure foundation for variable VTTS with journey length. A mixture of RP, SP and experimental economics approaches may be useful;
- values of the non-time attributes of travel (comfort, security, information etc.). In principle we would like to see these introduced into mainstream cost-benefit analysis especially of public transport. Such values will need to be based securely against values of time;
• variations in VTTS between driver/passenger and for larger groups. We have found in this piece of work that larger groups should probably be assigned lower VTTS per person than solo drivers;
• the value of savings in congested time and in changes in reliability are increasingly important issues not considered in this report.

We believe that each of the above could significantly affect the relative worth of different policies and projects and therefore merit pursuing further.

REFERENCES


