AECOM

M6T Research Study – Freight Stated Preference Summary Report

Prepared by: .... Approved by: ....
Martin Bright
Director

Rev No	Comments	Date

Beaufort House, 94/96 Newhall Street, Birmingham, B3 1PB
Telephone: 0121 262 1900 Fax: 0121 262 1994 Website: http://www.fabermaunsell.com

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1 Introduction

1 Introduction

1.1 Background

The purpose of this study was to understand how toll levels on an interurban trunk road influence (freight) travel demands in circumstances where there is a choice between tolled and free routes. The study contacted M6T users and non-users in the corridor, and conducted interviews with Light Goods Vehicle (LGV) and Heavy Goods Vehicle (HGV) Drivers and Managers involving a wide variety of industrial sectors.

The M6 Toll Road is a 27 mile stretch of three lane motorway connecting junctions 11a and 4 of the M6, designed to alleviate the congestion on a busy stretch of this motorway around Birmingham. Current tariffs for HGVs are £9 per one-way journey, although at the time of the survey they were £7.50. Tariffs are £1 cheaper overnight (between 23:00 and 06:00). Figure 1.1 shows the Toll Road and surrounding area.

(Source: M6 Toll Website M6toll.co.uk)

Figure 1.1: M6 Toll Map

1.2 Layout of Report

Section 2 describes the data collection and survey design. Section 3 describes the characteristics of the collected dataset. Section 4 sets out the modelling framework and reports model results. Section 5 presents the recommended model and valuations of trip.

2 Data Collection and Survey Design

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2.1 Data Collection

Surveys were conducted as follows:

(i) **Face-to-Face**, utilising a laptop programmed to customise the SP experiments directly as the data on a current journey is input. Interviews took place with drivers who had made a stop at a truck-stop or motorway service area and confirmed that they were authorised to make decisions on use of toll routes:

(ii) **Phone**, whereby the initial approach is by phone to a manager, after which the information gained enabled customisation of the SP experiments prior to mailing out for postal return. Databases of freight operators moving goods within the M6 corridor formed the sample frame.

(iii) **Handouts**, whereby potential respondents were handed or posted a first stage questionnaire to collect customisation information (for postal return). A further postal questionnaire containing the customised SP experiments was then sent out. Initial contact was at roadside interviews, motorway service areas and by post to registered 'TAG' (Automatic charging device) users of the M6 Toll road.

Table 2.1 shows the number of survey respondents.

Table 2.1: Respondents by interview type

Interview type	Number of completed surveys (n)	Response rate
Face-to-face	62	
Phone	133	59%
Handouts	65	26%
Total	*260*	

2.2 The Stated Preference Experiments

Two SP experiments were conducted with each respondent. The first exercise involved explicit mention of the M6T. The second related to anonymous tolled and untolled motorways in order to avoid M6T specific effects that may be associated with the M6T in respondents' minds. In each case the SP was customised to the specifics of the journey being made by the respondent.

Both experiments aimed to capture valuations of Journey Time (VJT), Reliability Time (VRT) and start-stop time (VSST), in terms of £ per hour per lorry load. The M6 related exercise also sought to establish an alternative specific constant (ASC) for using the M6T, an ASC for the A road alternative, and the incentive required to re-schedule peak journeys into the off-peak.

Suitable questions were asked to enable the construction of the following attributes at the analysis stage:

- DT: Departure Time
- SST: Expected Time in Start-Stop Traffic
- EAT: Earliest Arrival Time
- LAT: Latest Arrival Time, specified as the time by which 98% of arrivals would have occurred.
- JT: Scheduled Journey Time, = EAT – DT
- RT: Reliability, or Journey Time Spread, = LAT – EAT
- JRT: 98% Journey Time, = LAT - DT

2.2.1 *M6T Related Stated Preference*

This design was based on one of the routes (M6T or not-M6T) given by the respondent in the journey information section, and examined how this route choice would be affected by changes in tolls and road conditions. The screening questionnaire provided sufficient information for customisation, regarding departure time, and earliest and latest arrival times. The experimental design therefore set out differences from these initial values.

This design is orthogonal in the differences of JT, RT and SST. Because only one alternative (the M6T) has a cost, the two cost differences are identical on each screen. Simulation testing revealed that the assumed values could be recovered if the ASC was assumed to be (close to) zero (as we supposed it might be), but that simultaneous estimation of both the ASC and the other parameters was subject to considerable error. To address this questioning took place directly seeking the ASC value, for example ‘how much would you be prepared to pay to use the M6T in the absence of changes in journey times?’’

Respondents were offered alternative journeys with each option indicating the *departure time*, amount of *start-stop driving time* (arising from congestion, road works, traffic lights etc), *earliest arrival time*, and *latest arrival time* (defined to exclude that one in fifty occasions where there is a delay due to accidents, break-downs etc). For the M6 Toll road, one-way tolls are used.

One journey each was offered by M6Toll road, M6 and an A-road option. Where individuals were travelling past/through the M6 Toll road in the peak, (defined as being between 6am and 10am and 4pm and 7pm exclusive) a departure time shift option was included as an additional tolled route option (at half the toll rate of the peak tolled option) to enable the calculation of the sensitivity to changes in departure time. Table 2.2 shows an example screen layout for the SP.

2.2.2 *Anonymous Toll Road Stated Preference Exercise*

This experiment did not explicitly mention the M6 Toll road but, instead, asked respondents to consider the effect of changes in tolls and road conditions in the situation where there has been an expansion in tolled motorways. This shifts the context away from the M6T where pre-determined attitudes might make the response more ‘short-term’. It also gave more freedom in setting toll levels and journey times to improve statistical estimation.

The layout of the SP screens was similar to that for the M6 related design but the attributes could be varied to a greater degree due to the implied longer distances involved. This presented more scope to explore differences in toll rates due to larger time savings.

Table 2.4: Example M6 Related SP exercise

Question 1a	M6 Toll 1	M6 Toll 2	M6	A Road
Road toll (£, one way)	£5.00	£2.50	£0.00	£0.00
Departure time	11:00	14:00	11:00	11:00
Expected time in stop/start traffic (minutes)	40	40	50	50
Earliest arrival time	12:45	15:45	13:15	12:45
Latest arrival time (barring weather/accidents or breakdowns), ie time by which 98% of consignments would arrive	13:30	16:30	14:30	13:40
Ranking (1 = best, 2 = 2nd choice, 3 = worst)				

Question 1b	M6 Toll 1	M6 Toll 2	M6	A Road
Road toll (£, one way)	£20.00	£10.00	£0.00	£0.00
Departure time	11:00	14:00	11:00	11:00
Expected time in stop/start traffic (minutes)	40	40	60	50
Earliest arrival time	12:50	15:50	13:05	13:05
Latest arrival time (barring weather/accidents or breakdowns), ie time by which 98% of consignments would arrive	13:35	16:35	14:20	14:00
Ranking (1 = best, 2 = 2nd choice, 3 = worst)				

Question 1c	M6 Toll 1	M6 Toll 2	M6	A Road
Road toll (£, one way)	£10.00	£5.00	£0.00	£0.00
Departure time	11:00	14:00	11:00	11:00
Expected time in stop/start traffic (minutes)	40	40	60	60
Earliest arrival time	12:55	15:55	13:25	12:55
Latest arrival time (barring weather/accidents or breakdowns), ie time by which 98% of consignments would arrive	13:40	16:40	14:20	14:10
Ranking (1 = best, 2 = 2nd choice, 3 = worst)				

Question 1d	M6 Toll 1	M6 Toll 2	M6	A Road
Road toll (£, one way)	£15.00	£7.50	£0.00	£0.00
Departure time	11:00	14:00	11:00	11:00
Expected time in stop/start traffic (minutes)	40	40	50	60
Earliest arrival time	13:00	16:00	13:15	13:15
Latest arrival time (barring weather/accidents or breakdowns), ie time by which 98% of consignments would arrive	13:45	16:45	14:30	14:10
Ranking (1 = best, 2 = 2nd choice, 3 = worst)				

3 Data Description

3 Data Description

3.1 The Dataset

Table 3.1 presents the number of respondents broken down by HGV/LGVs' usage and interview type. The two vehicle categories are not mutually exclusive - respondents had the opportunity to register that they used both LGVs and HGVs if the choice of vehicle would not affect their choice of route or tolled road options. We therefore defined three categories, HGV, LGV and both.

Table 3.1: Vehicle type breakdown by interview type and HGV/LGV

	All Respondents		Traders	
Interview type	**LGVs**	**HGVs**	**LGVs**	**HGVs**
Phone	73	75	54	56
Face-to-face	12	62	8	51
Postal	36	43	26	34
Total	*121*	*180*	*88*	*141*

3.2 Interview Type

Table 3.2 reports average values and standard deviations for journey times, journey time spreads and start-stop time by interview type.

Table 3.2: Journey time elements (in minutes) by interview type

Interview type	Journey Time (JT)		Journey Time Spread (RT)		Start Stop Time (SST)		n
	Average	***SD***	**Average**	***SD***	**Average**	***SD***	
Phone	406	*390*	95	*81*	45	*41*	133
Face-to-face	378	*433*	107	*106*	38	*32*	62
Handouts	272	*270*	42	*57*	19	*20*	65

Our view is that the journey time averages and spread reported for the handout survey are typical of M6T corridor users, being from the closest approximation we have to a random sample of all those with a reasonable option of using the M6 Toll road. The face-to-face interviews intercepted actual journeys, but only those long enough to need a truck or service station stop. The even higher levels of journey time from the phone survey are something of a mystery. Possibly, when managers selected an in-scope journey, the longer journeys came more easily to mind. These respondents may have been in a head office far distant from the M6T. Therefore, the face-to-face and phone respondents are not a representative sample, at least with respect to journey length.

3.3 Economic Sectors

The study defined six "economic sectors" between which freight movements were made:

- P – Primary Farm / mine (quarry) / fishery
- M – Manufacturing Factory / workshop / brewery
- D – Distribution Warehouse / storage depot
- E – Energy Refinery / mine / power plant
- C – Construction Building/ prefabrication site
- F – Final Retail outlet / final customer
- S- Services Service sector

The 260 interviews were categorised relative to pairs of the above, based where possible on direct information from the respondent, but otherwise deduced from origin and destination, commodities and industry knowledge. Of these sector to sector movements, DD, DF, MD, MF and MM were individually large enough to experiment with, along with all primary flows merged together (as “P” and referred to later as Bulks), service based movements (as “S”) and all other flows (as “O”).

Table 3.3 shows the vehicle types used by each sector. As expected, LGVs have mainly been found undertaking Services, Manufacturing to Distribution and Distribution to Final; whereas HGVs have been mainly found carrying out Manufacturing to Manufacturing, Manufacturing to Distribution and Distribution to Distribution trips. The table also shows the proportion of respondents by sector who use the M6T. This shows that those least likely to be users are Manufacturing to Manufacturing, and Services.

Table 3.3: Distribution of vehicle type across the classified sectors

Sector	Vehicle Class		M6T Usage	
	LGVs* (%)	HGVs* (%)	M6T Users (%)	Non-Users (%)
Distribution to Distribution (DD)	30%	70%	48%	52%
Distribution to Final (DF)	61%	39%	52%	48%
Manufacturing to Distribution (MD)	28%	72%	44%	56%
Manufacturing to Final (MF)	56%	44%	53%	47%
Manufacturing to Manufacturing (MM)	14%	86%	31%	69%
Services (S)	73%	27%	35%	65%
Bulks (P)	26%	74%	60%	40%
Others (O)	68%	32%	53%	47%

*Not mutually exclusive

3.4 Benefits from M6T Usage

Tables 3.4 reports the amounts that respondents stated they would be willing to pay to use the M6T if journey time and journey time spread were the same on the M6T as on the M6.

Table 3.4: Unpacking the ASC for M6 Toll road (pence)

	Surface is smoother	Less stop/start driving	Impresses the customer	Provides a less stressful period for the driver	Better fuel consumption	Others	TOTAL
Drivers	10	37	5	14	7	0	74
Managers	4	21	5	17	21	2	70
LGVs	5	17	3	12	12	1	49
HGVs	9	37	6	21	20	1	94
Drivers/HGVs	11	39	5	15	7	0	76
Drivers/LGVs	5	17	3	9	7	0	42
Managers/HGVs	5	29	7	26	35	2	104
Managers/LGVs	4	16	3	13	15	1	52

Table 3.4 shows that respondents would pay an average of £0.72 to obtain the non-journey time and journey time spread related benefits of using the M6 Toll road. The largest component, 29p, is accounted for by a reduction in start-stop driving. The SP modelling will directly account for this trip attribute. This leaves 43p comprised of 7p for smoother surface, 5p for impressing the customer, 16p for reducing driver stress and 15p for better fuel consumption.

It is interesting to note that whilst Drivers and Managers have similar overall valuations, Drivers weight more highly the benefits from less start-stop driving, whilst Managers weight better fuel consumption more important. HGV users value all attributes of the toll road significantly higher than LGVs.

4 Modelling Framework and Results

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4.1 Model Forms

The initial model form used is the basic MNL model:

$$U_{ijk} = \sum_{r\neq 1} \alpha_r DR_{ijkr} + \beta.C_{ijk} + \gamma.DT_{ijk} + \lambda.JT_{ijk} + \mu.RT_{ijk} + \theta.SST_{ijk} + \varepsilon_{ijk}$$

Where:

- *i* is the individual respondent (i=1, n where n is the number of respondents being modelled);
- *k* is the SP option set (i.e. 'screen', k=1, 4);
- *j* is the alternative within option set *k* (j=1, 3 for off-peak; j=1, 4 for peak);
- *r* are the road type options (r=1, 3 with r = 1 representing the untolled M6);
- DR_{ijkr} are dummy (0,1) variables, with the value 1 if alternative *j* within option set *k* for individual *i* is road type *r*;
- DT_{ijk} is a dummy (0,1) variable with the value 1 if alternative *j* within option set *k* for individual *i* involves a shift in Departure time (i.e. if the original journey was 'peak');
- *C* is the cost variable, zero for untolled roads and initially equal to the Toll for the M6T, but later sometimes equal to Toll minus individual *i*'s directly reported ASC;
- and JT, RT and SST as previously defined.

Segmentations on the Cost variable took place as follows. The segmented cost model is:

$$U_{ijk} = \sum_{r\neq 1} \alpha_r DR_{ijkr} + [\beta + \omega_s DC_{is}].C_{ijk} + \gamma.DT_{ijk} + \lambda.JT_{ijk} + \mu.RT_{ijk} + \theta.SST_{ijk} + \varepsilon_{ijk}$$

where DCi are dummy (0,1) variables, taking the value zero unless that individual respondent i satisfies the criterion for segmentation s for a particular variable (e.g. is a Driver as opposed to a Manager). For other segmentation variables, further coefficients are added to the Cost. Segmentations on JT, RT and SST took place in a similar way.

The SP analysis also extended to the use of Mixed Logit that began by adding a Normally distributed random term ν to the ASC coefficient, in addition to the standard Logit εijk for the model as a whole, to obtain:

$$U_{ijk} = \sum_{r\neq 1} [\alpha_r + \nu_{ir}] DR_{ijkr} + \beta.C_{ijk} + \gamma.DT_{ijk} + \lambda.JT_{ijk} + \mu.RT_{ijk} + \theta.SST_{ijk} + \varepsilon_{ijk}$$

This allows the ASCs αr to vary randomly with the individual *i*. Further Mixed Logit work added error terms to C, JT, RT and SST in a similar way, but with Log-normal distributions.

4.2 Stated Preference Data Analysis

Initially the two SP exercises were analysed separately but this provided very few models that were considered worth retaining. Table 4.1 shows the one model that was deemed worthy of further consideration. The 'Base Values' shown are those applicable when the segmenting variables are all set at their default (base) levels. For other levels, e.g. for 'Managers' instead of 'Drivers', the Base values should be multiplied by the 'Base Value Adjustment Factors' (BVAF) shown in the tables.

Table 4.1 Preferred SP Model – Anonymous Toll Road Design

	Coeff	*t-stat*	*Base Value*	
Cost	-0.214	-9.8		
Journey time (JT)	-0.013	-3.8	3.63	£/h
Journey time spread (RT)	-0.011	-2.2	2.98	£/h
Start-Stop time (SST)	-0.040	-17.9	11.18	£/h
Toll Road ASC	-0.082	-0.4	0.38	£
Base Cost*Drivers			Base Value Adjust Factor	
Cost*Manager	-0.092	-4.7	*0.699*	
Base: Cost*(HGV/ mixed)				
Cost*LGV only	-0.060	-2.5	*0.780*	
Base=(DD,MD,MM)				
Cost*(DF)	0.118	4.8	*2.234*	
Cost*(MF,P)	-0.031	-1.0	*0.874*	
Cost*Service	0.121	4.0	*2.304*	
Cost*Other	0.049	1.6	*1.298*	
Base: Cost*Not from a port				
Cost*From a Port	-0.029	-1.0	*0.879*	

Examination of the two sets of models indicated that pooling the two data sets could yield an improved outcome. At the very least the increased sample size would, all else equal, improve the explanatory power of the model. A number of pooled models were examined but did not result in any significant improvement on the model shown in Table 4.1 especially as this was based on all respondents.

4.3 Mixed Logit Model

During the SP design process it was realised that it was unlikely that accurate recovery of both the journey time coefficients and the ASC in favour of the tolled road would be achievable. This is because realism required the tolled roads usually to be quicker and more reliable than non-tolled roads.

Consequently, use of a Mixed Logit Normal Distribution for the ASC took place. Several models were examined including models which only include a Normal distribution on the ASC, models that add Log-normal distributions for the time variables, and models that add a Log-normal distribution for Cost and estimates correlations between the Cost and Time parameters. As the estimated parameter on the time coefficients are distributed Log-normally, they do not represent the mean value but a transformation of the mean and (Normally distributed) variance. Table 4.2 presents the preferred MMNL model which has normal distributions on ASC's and log normal distributions on time variables.

Table 4.2: Mixed Logit Model

	Parameter	*t-stat*	*Base Value*		Distribution Param	*t-stat*
Cost	-0.592	-6.5				
Journey time (JT) *	-3.884	-13.8	3.33	£/h	0.97	3.8
Journey time spread (RT) *	-4.120	-4.8	2.70	£/h	-0.99	-2.6
Start-Stop time (SST) *	-2.956	-21.7	11.5	£/h	1.25	9.9
Tolled Road ASC†	-0.349	-0.9	-0.59	£	3.54	9.0
*Base Cost*Managers*						
Cost*Drivers	0.175	3.2				
Base: Cost(HGV only and mixed)*						
Cost*LGV only	-0.178	-2.6				
Base=(DD,MD,MM)						
Cost*(DF)	0.259	3.9				
Cost*(MF,P)	-0.124	-1.3				
Cost*Service	0.248	2.9				
Cost*Other	0.125	1.5				
*Base: Cost*Not from a port*						
Cost*From a Port	0.026	0.4				

Figures 4.1 to 4.4 for the MNNL are very informative. There are two distributions for each parameter, the first the density and the second the cumulative. The distributional form chosen for JT, RT and SST were all Log-normal with a lower bound fixed at zero, whilst that for the ASC was Normal.

It is noted that half of the modelled individual values of journey time (VJT) were below £2/hr since the cumulative function had reached 0.5 at about that value. The modal VJT is less than £1/hr. There is a long tail to the right, but very few values will be above the driver's wage rate (around £10/hr).

We would expect the VRT to be in the range 0.5 VJT to VJT and that is the case here, with the median about £1.60/hr. The value of the start-stop time has a much longer tail, with a median slightly above £5/hr, but a mode of less than £2/hr. The estimated distribution of the value of the ASC is much wider than is plausible. This almost certainly arises from leakage of random noise from the residuals. The average value is slightly above zero.

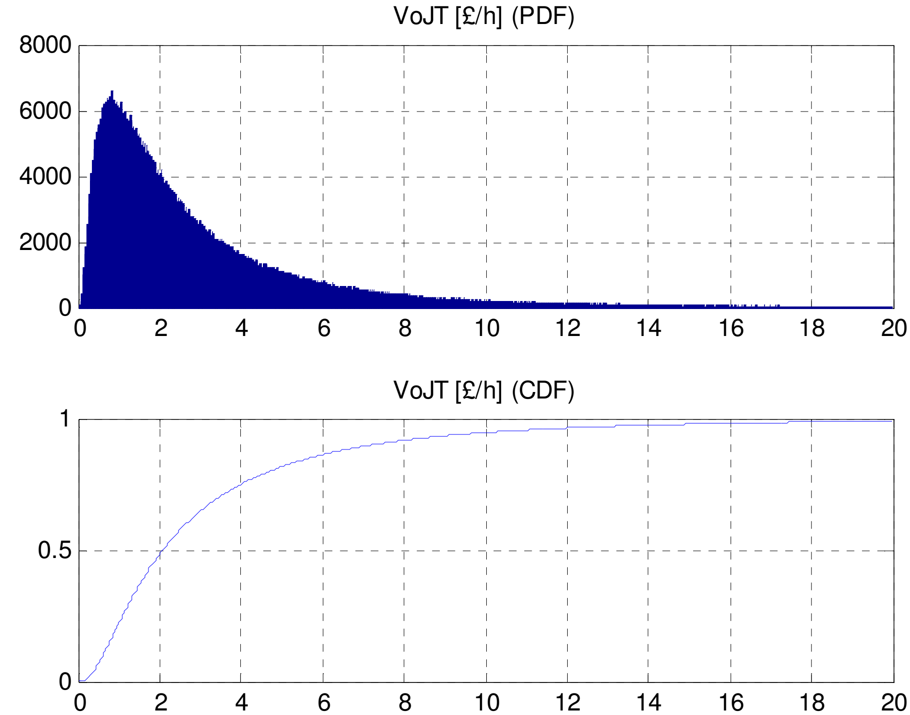

Figure 4.1: Distribution of VJT from Mixed Logit Model

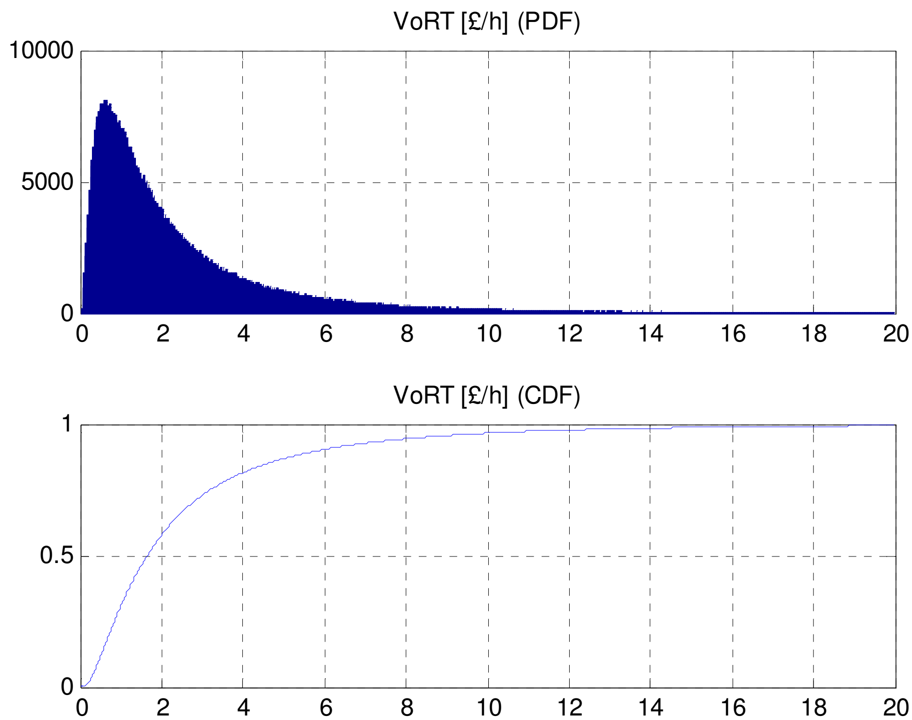

Figure 4.2: Distribution of VRT from Mixed Logit Model

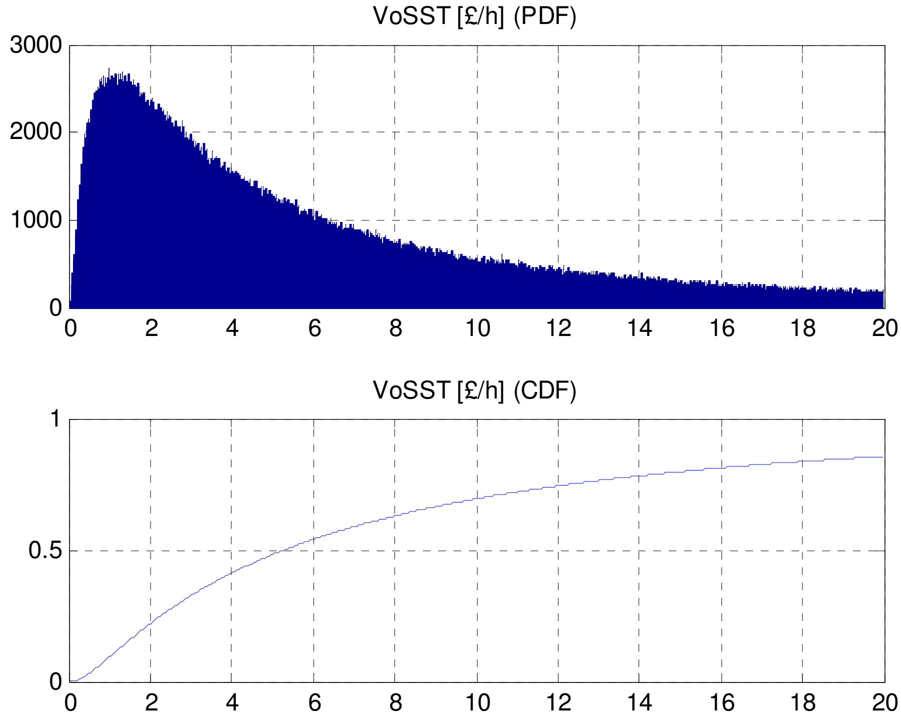

Figure 4.3: Distribution of VSST from Mixed Logit Model

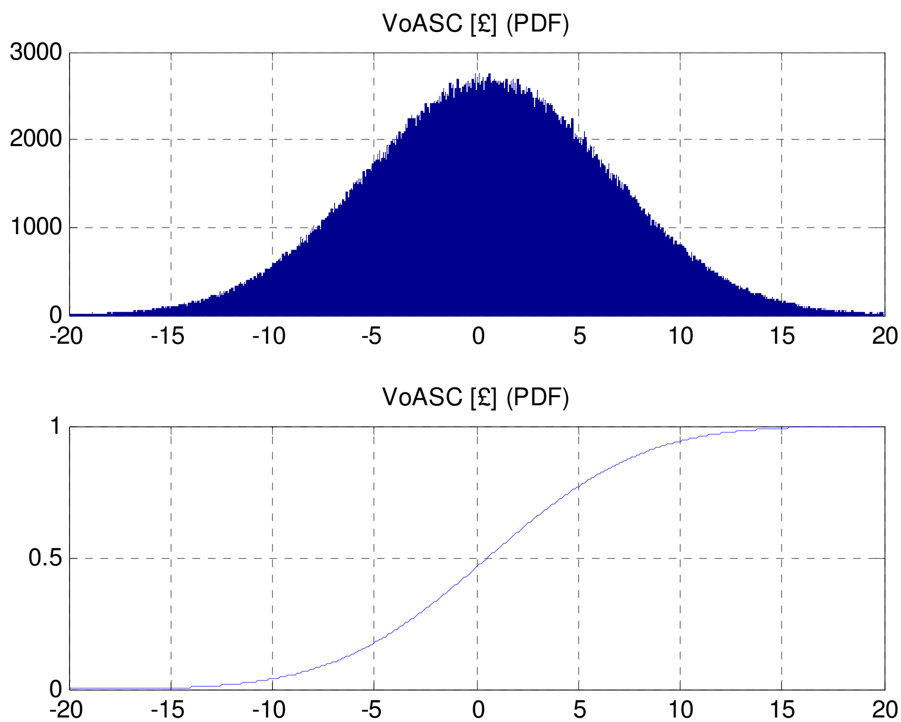

Figure 4.4: Distribution of ASC from Mixed Logit Model

5 Recommended Model and Monetary Values

5 Recommended Model and Monetary Values

5.1 Introduction

This section provides our final recommendations regarding preferred models, and discusses implications for monetary valuations of journey time savings. These monetary valuations are derived as the ratio of the appropriate time and cost coefficients, having taken account of dummy variable effects.

5.2 Monetary Valuations

When calibrating segmented models it becomes difficult to see the implications for monetary values. While it might seem sufficient to take a coefficient, say for start-stop time, and divide it by the cost coefficient, the resulting monetary valuation will only apply when all the other segmentation effects are set at their implicit default values. Here the defaults are:

(i) Drivers (as opposed to Managers);
(ii) The firm runs either just HGVs or both HGVs and LGVs (as opposed to just LGVs);
(iii) The movement is from a Distribution site to a Distribution site (DD), from Manufacturing to Distribution (MD) or from Manufacturing to Manufacturing (MM); and
(iv) The traffic is not moving from a port.

On that default basis, Table 5.1 presents the monetary valuations of JT, RT and SST from the preferred Anonymous toll model, the best Pooled Model, and the preferred Mixed Logit Model.

Table 5.1: Monetary Values: HGV Drivers to Distribution or Manufacturing, not from a port for selected Models (All respondents).

	Anonymous Toll Model Value *(t-stat)*	**Best Pooled Model All Value *(t-stat)***	**Mixed Logit Model All Value *(t-stat)***
Journey time (JT) £/hr	3.63 *(3.8)*	4.26 *(4.8)*	4.73 -
Journey time spread (RT) £/hr	2.98 *(2.1)*	0.99 *(1.0)*	3.83 -
Start Stop time (SST) £/hr	11.18 *(9.2)*	12.17 *(11.0)*	16.33 -

Construction of monetary valuations can take place for any combination of effects desired. Table 5.2 reports detailed segmentations of the value of journey time, journey time spread and start-stop time measures for the Multinomial Model. These arise from the Base Value Adjustment Factors reported in Table 4.1.

Looking across the models and time measures, Drivers have higher valuations than Managers do, HGVs have higher valuations than LGVs, and the Services sector have higher values than elsewhere. The Driver/HGV/Service sector combination has the highest monetary values, with £8.38, £6.87 and £25.75 per hour respectively for JT, RT and SST. The lowest values are found in Managers/LGV/MF and P sector, of £1.96, £1.61 and £6.02 per hour respectively for JT, RT and SST.

Table 5.2: VJT, VRT, and VSST by sector, respondent type and vehicle type (not from port), in £/hr from Multi-nomial Logit Model (Anonymous Toll Road)

			DD,MD,MM	DF	MF,P	Services	Other
VJT	Driver	HGV/Mixed	3.63	8.12	3.18	8.38	4.72
	Driver	LGV	2.83	4.98	2.55	5.07	3.45
	Manager	HGV/Mixed	2.54	4.13	2.31	4.20	3.02
	Manager	LGV	2.12	3.13	1.96	3.17	2.45
VRT	Driver	HGV/Mixed	2.98	6.67	2.61	6.87	3.87
	Driver	LGV	2.33	4.09	2.09	4.16	2.83
	Manager	HGV/Mixed	2.08	3.39	1.89	3.45	2.48
	Manager	LGV	1.74	2.57	1.61	2.60	2.01
VSST	Driver	HGV/Mixed	11.18	24.97	9.77	25.75	14.51
	Driver	LGV	8.72	15.31	7.84	15.60	10.62
	Manager	HGV/Mixed	7.81	12.71	7.10	12.91	9.30
	Manager	LGV	6.52	9.62	6.02	9.74	7.53

Understanding the monetary valuations from the Mixed Logit analysis is more complex. Where the time attributes are Log-normal distributions, the means and median values of time arise without simulation. The distributed Log-normal parameter on the time coefficients means that they do not represent the mean value, in the same way as fixed or Normally distributed values would. Instead the journey time coefficient is a transformation of the mean and (normally distributed) variance. From this, we can calculate the distribution of the values of journey time, with the relevant segmentations. From this expression, we can also derive the mean and medians of the values of journey time.

$$\beta_{JT} = e^{\mu_{JT}+\sigma_{JT}\nu}, \nu \sim N(0,1)$$

$$VoJT \sim -\frac{e^{\mu_{JT}+\sigma_{JT}\nu}}{\beta_c+\beta_{cdriver}+\ldots} = e^{\mu_{JT}-\ln(-(\beta_c+\beta_{cdriver}+\ldots))+\sigma_{JT}\nu}$$

$$Mean(VoJT) = e^{\mu_{JT}-\ln(-(\beta_c+\beta_{cdriver}+\ldots))+\frac{\sigma_{JT}^2}{2}}$$

$$Median(VoJT) = e^{\mu_{JT}-\ln(-(\beta_c+\beta_{cdriver}+\ldots))}$$

Exactly the same process is required to derive distributions for the value of reliability and start-stop time.

For the ASC, which is normally distributed, the following process applies:

$$ASC = \mu_{ASC} + \sigma_{ASC}\nu, \nu \sim N(0,1)$$

$$VoASC \sim \frac{\mu_{ASC}+\sigma_{ASC}\nu}{\beta_c+\beta_{cdriver}+\ldots} = \frac{\mu_{ASC}}{\beta_c+\beta_{cdriver}+\ldots} + \frac{\sigma_{ASC}}{\beta_c+\beta_{cdriver}+\ldots}\nu$$

$$Mean(VoJT) = Median(VoJT) = \frac{\mu_{ASC}}{\beta_c+\beta_{cdriver}+\ldots}$$

Tables 5.3, and 5.4, show the mean, and median, of the VJT, VRT and VSST distributions. Due to the positive skew of the Log-normal distribution, the means are larger than the medians. Again, across the models and time measures, Drivers have higher mean and median valuations than Managers, HGVs higher than LGVs but this time the higher values occur in the DF sector.

The Driver/HGV/DF sector combination has the highest monetary values, with medians of £7.84, £6.19 and £19.84 per hour respectively for JT, RT and SST. The lowest median values are found in Managers/LGV/MF and P sector, of £1.38, £1.09 and £3.49 per hour respectively for JT, RT and SST.

Table 5.3: Mean values of VJT, VRT, and VSST by sector, respondent type and vehicle type (not from port), in £/hr from Mixed Logit Model

			DD,MD,MM	**DF**	**MF,P**	**Services**	**Other**
VJT	Driver	HGV/Mixed	4.73	12.54	3.65	11.72	6.77
	Driver	LGV	3.32	5.88	2.74	5.69	4.20
	Manager	HGV/Mixed	3.33	5.93	2.75	5.75	4.23
	Manager	LGV	2.56	3.86	2.21	3.78	3.06
VRT	Driver	HGV/Mixed	3.83	10.14	2.95	9.47	5.47
	Driver	LGV	2.68	4.75	2.22	4.60	3.40
	Manager	HGV/Mixed	2.70	4.80	2.23	4.64	3.42
	Manager	LGV	2.07	3.12	1.78	3.06	2.47
VSST	Driver	HGV/Mixed	16.33	43.26	12.58	40.44	23.35
	Driver	LGV	11.44	20.28	9.46	19.64	14.49
	Manager	HGV/Mixed	11.50	20.47	9.50	19.82	14.59
	Manager	LGV	8.84	13.33	7.61	13.05	10.56

Table 5.4: Median values of VJT, VRT, and VSST by sector, respondent type and vehicle type (not from port), in £/hr from Mixed Logit Model

			DD,MD,MM	**DF**	**MF,P**	**Services**	**Other**
VJT	Driver	HGV/Mixed	2.96	7.84	2.28	7.33	4.23
	Driver	LGV	2.07	3.68	1.72	3.56	2.63
	Manager	HGV/Mixed	2.08	3.71	1.72	3.59	2.64
	Manager	LGV	1.60	2.42	1.38	2.36	1.91
VRT	Driver	HGV/Mixed	2.34	6.19	1.80	5.79	3.34
	Driver	LGV	1.64	2.90	1.35	2.81	2.07
	Manager	HGV/Mixed	1.65	2.93	1.36	2.84	2.09
	Manager	LGV	1.26	1.91	1.09	1.87	1.51
VSST	Driver	HGV/Mixed	7.49	19.84	5.77	18.54	10.71
	Driver	LGV	5.25	9.30	4.34	9.01	6.65
	Manager	HGV/Mixed	5.28	9.39	4.36	9.09	6.69
	Manager	LGV	4.05	6.11	3.49	5.98	4.84