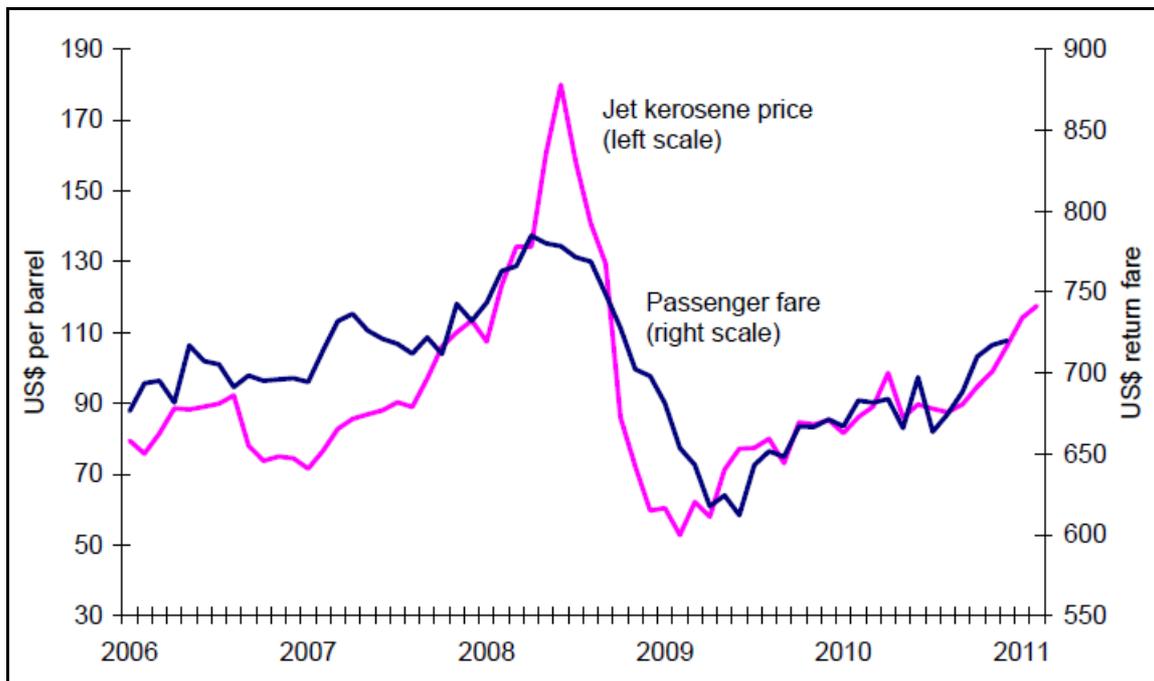


The Transport Economist

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Airlines in a carbon traded world and the perils of aviation forecasting

Peter Hind, RDC Aviation

Tim Coombs, Aviation Economics

Arup

22 June 2011

Peter Hind had worked for BMI for ten years and a further ten years as a consultant looking at forecasting and route economics. He began by looking at the timeline of emissions pricing. Following the Kyoto protocol it was proposed to include aviation in the emissions trading scheme in 2006. In August 2008 a compromise agreement was reached by the EU for trading to start in January 2012. Airlines were required to start monitoring their emissions from last year.

The General Secretary of IATA, Giovanni Bisignani, said that airlines were able to break even with oil at a price of \$100 to \$110 a barrel¹. However, where will the price sit in the long term? In general Jet A1 prices were around 10% higher than crude costs after refining and distribution. Fuel costs were generally more of a barrier to growth than carbon costs.

Global emissions had increased by 8% globally and 5% in Europe between 2006 and 2010, as shown in Table 1.

Table 1: recent growth in global emissions

Year on year	Global	Europe
2007 on 2006	5.5%	6.1%
2008 on 2007	1.6%	0.7%
2009 on 2008	-3.1%	-4.5%
2010 on 2009	4.1%	3.3%
Average	1.95%	1.31%

Source: RDC Aviation analysis

¹ Eight barrels is approximately one tonne of oil which produces approximately three tonnes of CO₂

The quest for greater efficiency predates the push for CO₂ reduction and various types of aircraft using new technologies, such as composites and blended wings, together with engine developments, offered significant reductions. However, developments took a long time.

The bulk of carbon credits will be allocated for free, based on historical usage. Anything above this has to be purchased.

A list of airlines and competent authorities has been published by the EU. Almost 5,000 operators were involved with the ETS.

Baseline data has been released by the Commission. Average annual emissions from 2004-6 were 218 million tonnes of CO₂. From 2010 carriers should be reporting their CO₂ emissions, which are compulsory, and their tonne kilometres, which are optional. Tonne-kilometre data will be used to allocate a fixed level of allowances between carriers.

Verifiers are currently working through the first round of emissions verification for submission this month.

There will be winners and losers in the process. Aviation looks certain to enter the ETS as a net buyer of credits.

Table 2: effect of emissions trading schemes on CO₂ emissions

	Million tonnes of CO₂
Baseline	218
Phase 2 cap	211
Free 2012 allocation of credits	174
Auction & AEU Procurement	+50
Carbon Equivalent Reduction Import	+40
Shortfall (total of auction + CERI)	+90
Forecast emissions of CO ₂ in 2012	264

Source: RDC Research Analysis

There are various options for abatement, some cheaper than others. These include the following:

- Air traffic management improvements
- Fleet retirement and replacement with more efficient aircraft

- Biofuels, Hydrotreated Vegetable Oils (HVO) and algae
- Advanced fleet retirement before normal retirement age and replacement with more efficient aircraft
- Next generation technologies

The cheapest way is currently to purchase credits from other emitters such as power producers.

There are particular issues with biofuels, which are a traded commodity. There is a striking correlation between the price of Jet A1 and feedstocks such as rapeseed, palm and soy oil. It would take a landmass the size of Belgium to produce enough fuel to supply British Airways. There are also delays with certification. However there are several different types of project and they are making some progress. There is an ambition to achieve 10% biofuel usage by 2020, but they are not currently viable and may never be.

One solution could be for European airlines to make a stopover at a non-European hub. Peter gave an example of a stopover at Istanbul on a London-Bangkok sector, shown in Table 3.

Table 3: analysis of stopping en route from London-Bangkok

	Non-stop	One-stop	
	London-Bangkok	London-Istanbul	Istanbul-Bangkok
Distance (nautical miles)	5,165	1,355	4,048
Block time (minutes)	720	220	565
Costs	£77,075	£31,032	£60,253
Cost per ASM	9.0p	13.8p	9.0p
Average fare	£606	£200	£407
Revenue	£89,732	£31,032	£60,253
Revenue per ASM	10.5p	13.8p	9.0p
Profit	£12,657	Breakeven only	
Profit margin	14.1%		
Breakeven load factor	70.0%	82.8%	82.8%
Breakeven market size	115,958	137,208	137,208

The example assumes a daily return flight or 730 annual sectors, giving an annual capacity of 165,710 and, with 137,208 passengers, an average load factor of 82.8% With an average total fare of £606:

- A non-stop flight makes a fully allocated profit of £12.6 million
- A one-stop service will only break even

Business travellers in particular, who tend to subsidise leisure ones, prefer non-stop flights.

The speaker came to the following conclusions:

- There are unlikely to be any “winners” from ETS entrance.
- The estimated cost to the air transport industry is €1.5 billion in 2012, assuming a cost of €17 per tonne. The cost could, of course, be higher.
- A successful challenge by US and other non-EU carriers is likely to increase the cost for EU airlines and reduce international competitiveness.
- The potential to introduce jet and biofuel will bring financial benefits to long haul carriers.
- However, biofuels are unlikely to make a significant impact in the immediate future.
- The cost of existing jet fuel plus carbon offsets will be cheapest option for the medium term.

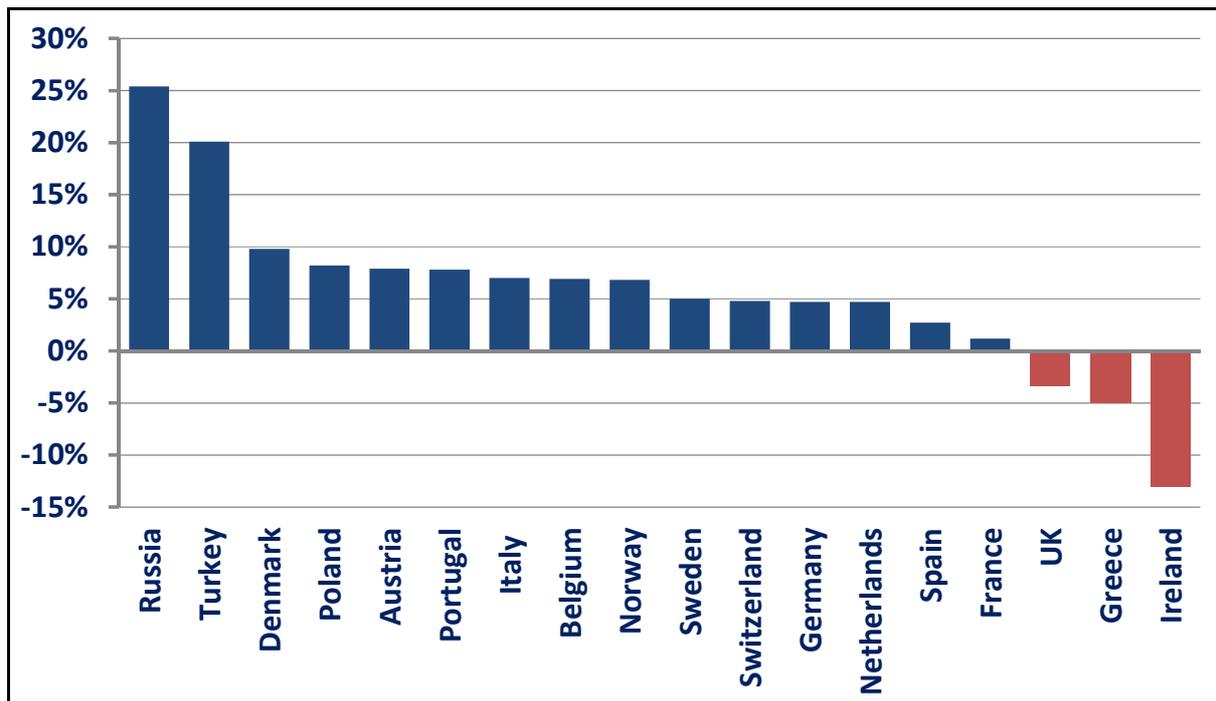
THE PERILS OF AVIATION FORECASTING

Tim Coombs, Managing Director of Aviation Economics, then talked on the perils of aviation forecasting.

The recovery was currently underway, with short term comparators looking favourable compared to 2010 which was affected by the volcanic ash closure of airspace and snow disruption. However the good news might not continue with the Japanese tsunami and political unrest in the Middle East and North Africa.

Growth rates varied between countries, as shown for 2010 in Figure 1.

Figure 1: annual growth in 2010



Source: annaaero.com

The greatest growth was in the Middle East, as shown in Table 4.

Table 4: average airport growth 2006 -2010

European airport	Growth	Middle East airport	Growth
Copenhagen	5%	Abu Dhabi	80%
Paris CDG	3%	Doha, Qatar	79%
Frankfurt	1%	Dubai	61%
Amsterdam	0%	Istanbul	50%
London Heathrow	-3%	Riyadh	37%

Source OAG

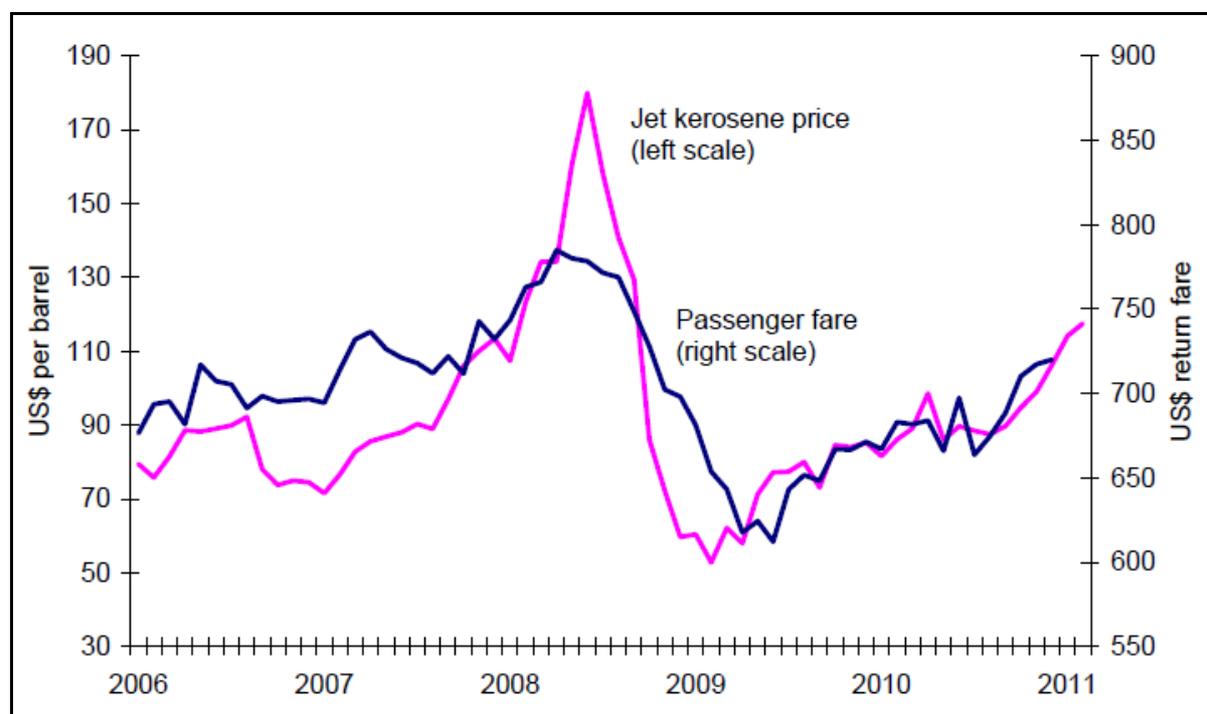
The main factors affecting traffic growth were capacity growth and supply and demand. This is largely GDP driven, and the rule of thumb was that it was around 2½ times that of GDP growth.

Other factors were competition from other modes of transport such as high speed rail, the real cost of travel, infrastructure constraints, the regulatory environment, airline strategy and other and “shock” events. These happen very regularly!

Over the last 40 years, passenger numbers have increased tenfold, and real fares declined by 60%. In the last decade, airlines have achieved \$60 billion of savings and costs have fallen by 9%. Fuel efficiency has improved by 24% and labour productivity is up 67%. However it was not clear that this could continue. Recent growth may have been due to low cost carrier penetration. Costs were going up, owing to increases in taxation, such as airline passenger duty and carbon taxes, while fuel prices were increasing over time.

Figure 2 shows the close correlation between fuel costs and air fares.

Figure 2: correlation between fuel costs and air fares



Source: Platts & IATA

There are also a number of infrastructure constraints which could limit growth, such as runways, terminals and air traffic control.

The regulatory environment had changed with greater deregulation and Open Skies agreements, such as that between the EU and Russia. However there is still a degree of protectionism with, for example, Germany, Austria and Canada limiting the frequencies of Emirates services.

Alliances are increasingly important and account for an increasing proportion of airline output, including 85% of transatlantic capacity. Tim was concerned that, from a consumer perspective, the reduction in capacity could lead to higher fares.

Table 5: total seats across the Atlantic (millions)

Alliance	2010	2011
SkyTeam	8.8	9.8
Oneworld	6.4	7.4
Star Alliance (core)	9.8	10.2
Star Alliance (other)	3.6	4.0
Unaligned	5.6	5.5

There was significant capacity growth in March 2011 over the previous year, as shown in Table 6.

Table 6: capacity growth, March 2011 relative to March 2010

Market	Capacity growth
Europe	7.2%
Europe to USA	10.0%
Europe to Asia	9.8%
Europe to Middle East	11.0%

However, in the euro area in 2011, forecast growth is only 1.6% in GDP and 1% in private spending. There is also the potential for further increases in taxes and fuel charges. Forecast GDP growth rates are listed below, but the accuracy is questionable.

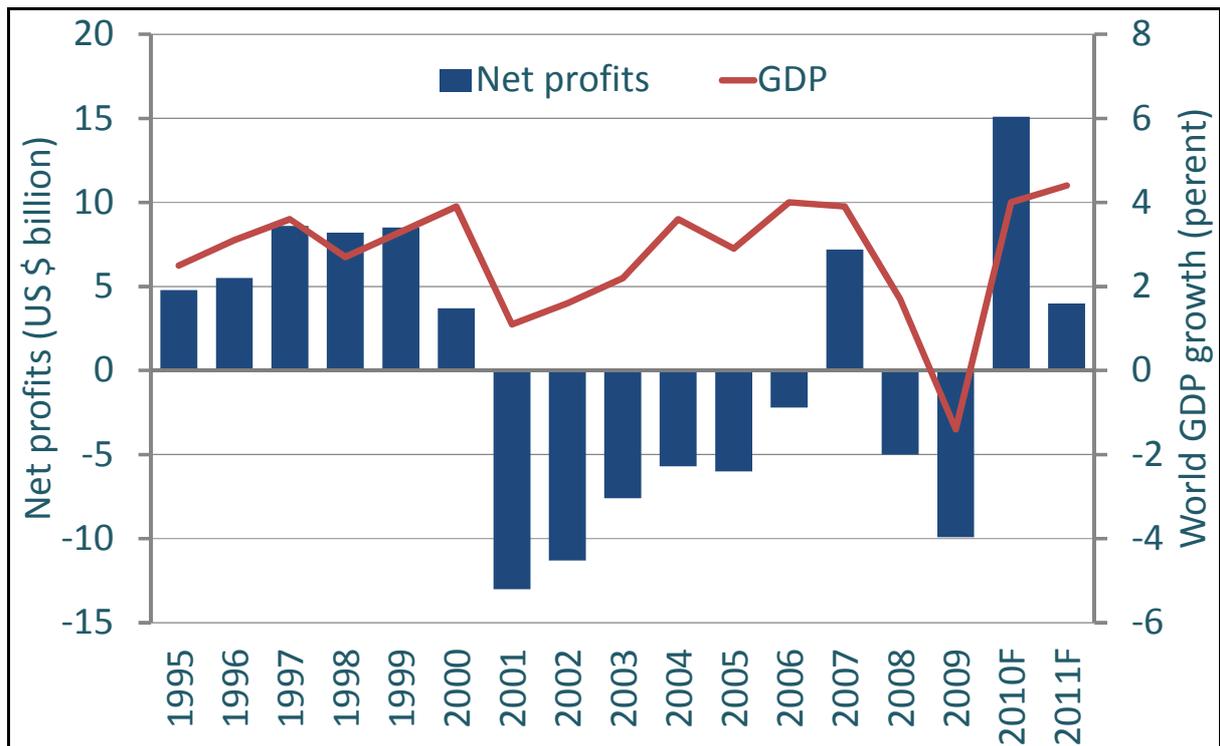
Table 7: GDP growth and forecasts

Year	Actual		Forecast	
	2009	2010	2011	2012
US	-2.6%	2.9%	3.3%	3.6%
Euro Area	-4.0%	1.7%	1.3%	1.3%
UK	-5.0%	1.6%	1.7%	2.5%
Asia (excluding Japan)	6.2%	9.4%	7.7%	7.3%
World	-0.7%	4.9%	4.1%	4.3%

Source: RBS

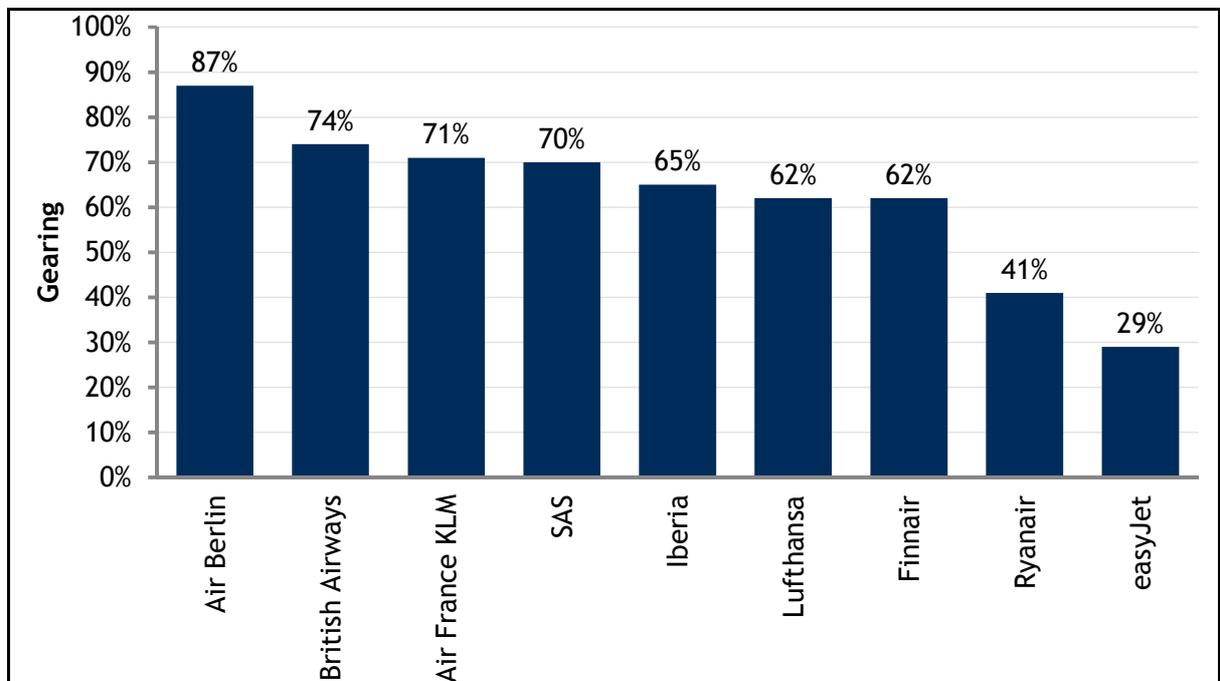
Airlines have never been particularly profitable, as shown in Figure 3.

Figure 3: airline profitability and GDP growth



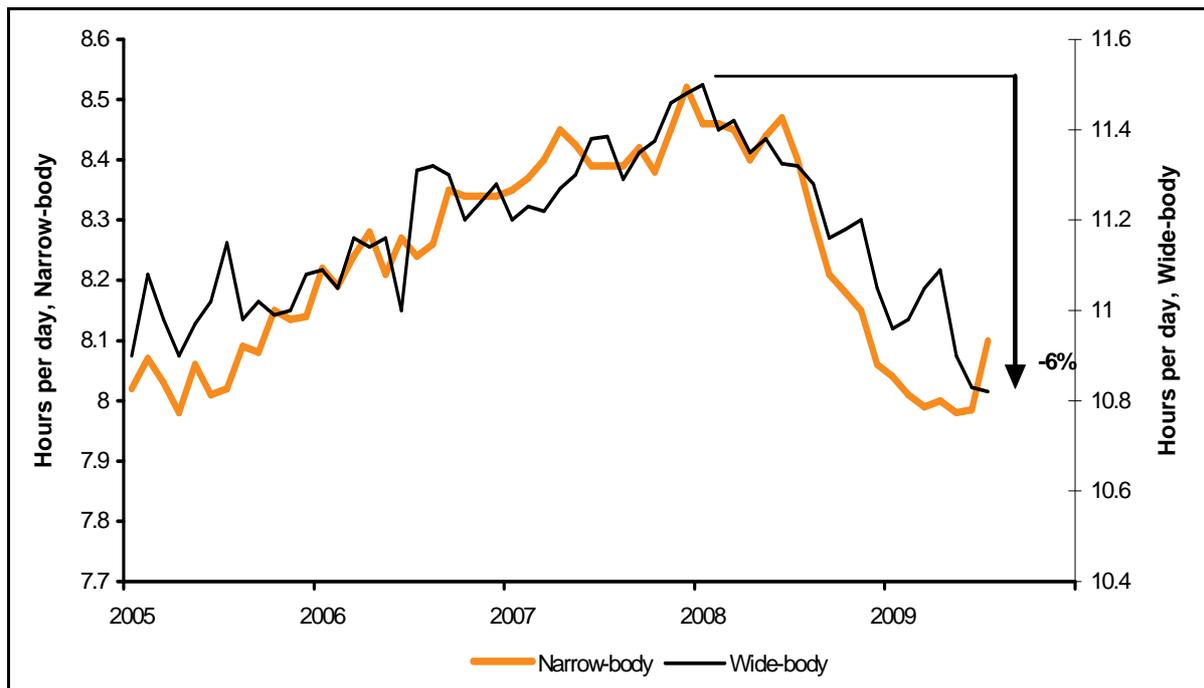
A number of airlines are heavily geared, which could result in problems if interest rates rise and airlines lack cash flow, as shown in Figure 4.

Figure 4: airline gearing



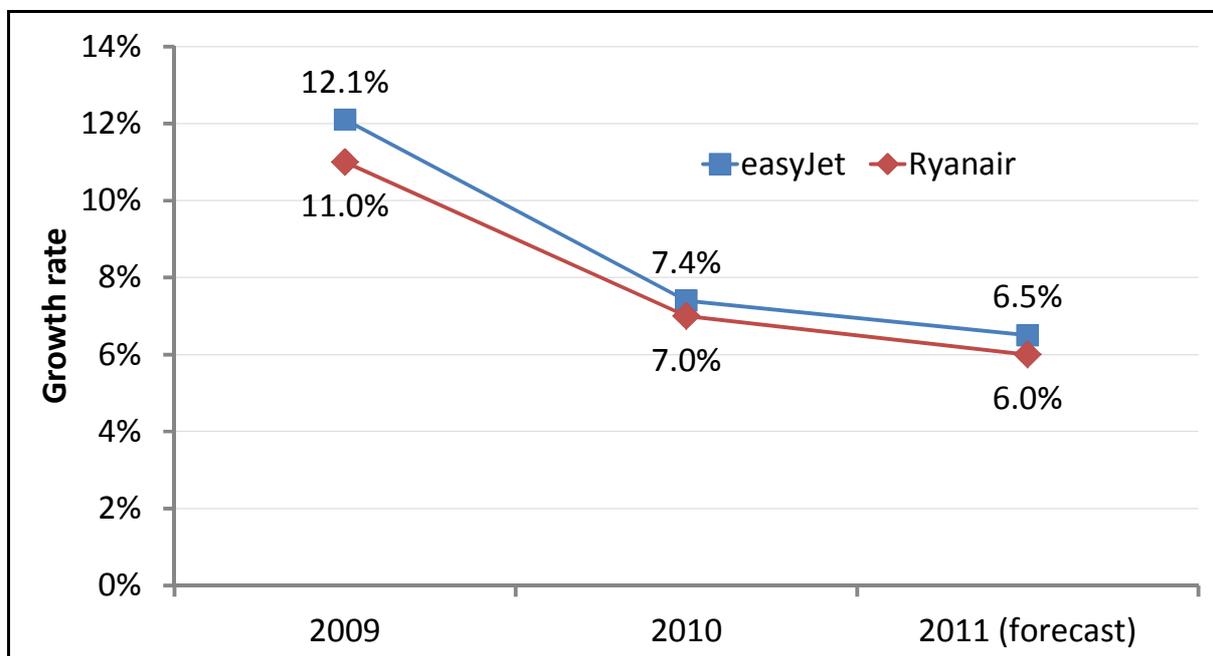
Aircraft utilisation has also been falling and declined by 6% last year.

Figure 5: aircraft utilisation since 2005



European low cost carriers' growth is slowing, as shown in Figure 6.

Figure 6: growth rates of low cost carriers



EasyJet and Ryanair account for 60% of European low cost carrier traffic. Low cost carriers have multiple bases and can easily move resources around and open new bases or close existing ones. According to ACI airports, in 2010 more than 4,741 new air routes were opened between European airports, but 3,330 were closed.

Ryanair has 10% route churn and indeed actively looks to close around 10% of routes each year. European regional airports are particularly at risk. This may spread to flag carriers. Austrian Airlines, which is owned by Lufthansa, may move some of its operations to Munich airport.

Fuel hedging is a short term strategy, of no more than 18 months and often less. While EU airlines have hedged 60% of their fuel requirements for 2011, this is only 33% for US carriers, 30% for Asia Pacific and 21% for Latin America. (Source Morgan Stanley)

The speaker concluded with industry trends, summarised in Table 8.

Table 8: summary of industry trends

Trend	Good for airlines	Good for airports
Airline consolidation	✓	
Increasing transparency on pricing	✓	
Smaller airports taking more risk to keep traffic	✓	
Shift in bargaining power between airports and airlines	✓	✓
Increasing deregulation		✓
Ancillary revenue opportunities		✓

DISCUSSION

Peter Gordon (Editor, The Transport Economist) noted that the proportion of US GDP spent on aviation had been 0.9% for many years up to 9/11 and then dropped to 0.75%. Growth in passengers above GDP had come about from increases in load factor and reductions in unit costs, neither of which could continue indefinitely.

Tim and Peter agreed and noted that load factors on U.S. carriers were increasing by 1% per annum, but the money spent filling them was falling. There was likely to be lower growth than the manufacturers forecast. The airlines currently subsidise the aviation sector. Tim did not think that it would change. The only sector which was growing really fast was the Middle East, where airlines lacked the profit motive.

Meyer Hillman (Policy Studies Institute) was staggered that there was no comment by either of the speakers on climate change.

Peter replied that aviation only accounted for 2% of CO₂ emissions. The trouble was that the fast growth was coming from the Middle East which, together with the USA and China, was not keen on carbon trading. The issues about, and effects of, methane and contrails are very complex. The CEO of Air New Zealand has said that he is very aware that people fly 12,000 miles to visit a “green” country while his counterpart in Air France KLM has noted that transporting tomatoes from Kenya to Amsterdam only produces 10% as much CO₂ as growing them locally, once heating costs are taken into account.

Tim Griffiths (Civil Aviation Authority) had two questions.

First, what proportion of the airfare would go in covering carbon credits? Peter said that it was very low, maybe only 1%, certainly much less important than APD.

Second, is Southend airport an effective competitor to Stansted? Southend airport is not regulated and this is an opportunity for it. The obvious user would be easyJet, as low cost carriers try not to compete directly with each other. There are instances of people driving from Liverpool to Leeds in order to save £5!

David Metz (University College London) noted that half of the population of this country did not fly last year. Is there a reservoir of demand?

Propensity to fly varies by region. There are various reasons for propensity to fly, such as the exchange rate. City break and long weekend trips could certainly decline, but 40% of all trips are for business or visiting friends and relatives (VFR).

Scott Clyne (Arup) commented on the progression from prop to turbojet to turbofan and wondered what the next disruptive technology might be.

It was likely to be geared turbines. With oil at its current and forecast prices, manufacturers were always looking at ways to innovate, with very bright people looking at ways to reduce fuel. There were currently various technical problems with biofuels. There were no obvious game changers. At oil prices over \$100 per barrel, 55% of the direct operating costs of an A380 between London and Singapore were fuel. It could be that Airbus was missing the point with their 2050 Vision. Pan Am used to have upstairs dining rooms before they realised that they could put revenue seats in the space.

Tim Elliot (Independent) estimated that 55% of growth was due to nonstop services or fewer transfers. Frequency has increased over time and there is a relationship between this and traffic growth.

Tim said that in the “old” days it was generally considered that the market penetration for business traffic was dependent upon frequency, and that for leisure traffic on price. It is possible to model the incremental cost of changing aircraft size against the incremental revenue? Owing to slot constraints, the short haul fleet of an airline such as BA was essentially fixed.

Alan Peakall (Retired) noted that biofuels are hydrocarbons. What therefore is the CO₂ benefit of using them?

Peter replied that the point of biofuels was that CO₂ was absorbed in their manufacture so that output was reduced by around 80% of the total life cycle. It is possible to dispute this. Biomass requires a lot of land and water and it is notable that there is wheat protectionism in Russia following a bad harvest, with an impact on spot prices, so supplies might not be secure!

Steve Lowe (MVA Consultancy) said that he helped to develop the carbon emission trading model and was surprised by the low incremental cost. He asked how biofuel technology was advancing. They required a large land area and had a terrible footprint. He also asked if there was a level playing field between European airlines and those of other countries.

Peter replied that he doubted that biofuels could provide the complete answer, requiring a large area to grow. Premium passengers wanted to fly nonstop. No, it was not a level playing field, but the issue was not really one of CO₂ but of other factors.

Report by Peter Gordon

Concessionary travel

Andrew Last, Minnerva Ltd

Arup

28 September 2011

INTRODUCTION

Andrew began by indicating that he would speak on:

- Background and recent history
- Operator reimbursement, the “big issue”
- A number of “research nuggets”

His focus would be on concessionary bus travel by older and disabled pass holders in England, although similar issues exist throughout the UK. He also acknowledged the contribution of various colleagues, in particular TEG member Eileen Hill, to his thinking on the topic.

HISTORICAL CONTEXT

Concessionary travel is the policy of making available cheap or zero fare use of public transport for selected groups – older people, the disabled, children – and is currently available on all local bus services in the UK. For older and disabled people it is now free at the point of use.

It originates in the municipal bus companies, probably as early as the 1950s, when a typical rationale was to allow needy sections of the community to use Council-owned buses off-peak when available at little marginal cost.

The Transport Act 1985: discretion

Concessionary travel was a key part of legislation that transformed the bus industry outside London from regulated and publicly owned to deregulated and privately owned. The Act regularised the provision of concessionary travel:

- Giving local Travel Concession Authorities (TCAs) discretion to set up concessionary travel schemes.

- Establishing the principle of “no better off and no worse off” for reimbursement of the operators: this is reasonable in principle but has proved to be difficult in practice.
- Setting up a framework for operator appeals in disputes about payment levels, with an initial intention of preventing overpayment to municipal operators as a means of distorting competition.

The Transport Act 2000: entitlement to half fare

In contrast to the discretion in the Transport Act 1985, the Transport Act 2000 introduced statutory half fare concessions for eligible older and disabled residents on local services.

2001 to 2006: entitlement to free travel

Between 2001 and 2006, free travel was introduced separately in Northern Ireland, Wales, Scotland and England, although some schemes in large conurbations had already provided free travel for many years. The statutory minimum provision is less generous in England than elsewhere, and excludes the weekday morning peak, but many TCAs have extended its scope on a discretionary basis.

Since 2008 local travel has been extended to national travel, but only on “local” buses as defined by factors such as the distance between stops. A separate concessionary scheme for coach travel is about to end.

In April 2011 responsibility for administration, and reimbursement of bus operators, shifted from second tier Districts to Counties, but it remained with Unitary Authorities and PTEs.

THE IMPACT OF FREE TRAVEL

Relative to the half fare regime imposed in 2000, the move to free travel has resulted in a growth of 30-70% in concessionary travel, the exact extent varying with a number of factors including rates of pass take-up.

For operators, there has been a 20% increase in total demand, with concessionary travel now representing a third of total demand and a quarter of all revenue.

For local authorities, expenditure on reimbursing operators has more than doubled, with the result that it is now the biggest component of local revenue spend on local buses, exceeding both revenue support and Bus

Service Operators Grant (BSOG). It is a substantial proportion of total transport spend, especially for the PTEs, which do not have highway responsibility, and as a statutory obligation takes precedence over supporting services, which can result in interesting headlines.

In addition, administrative and funding arrangements are dysfunctional:

- Department for Transport (DfT) imposed the statute
- Department of Communities and Local Government provides funding through formula grant
- Local authorities make payments to operators
- Department for Transport sets the reimbursement rules and adjudicates on disputes

REIMBURSEMENT

The quantum of reimbursement payment has been a major source of local disagreement between TCAs and operators. The process has proved highly contentious because the “no better off and no worse off” principle requires speculation on the counterfactual:

- The fare that would have been paid by passengers who would have travelled anyway
- The trips generated by the concession
- Any additional cost

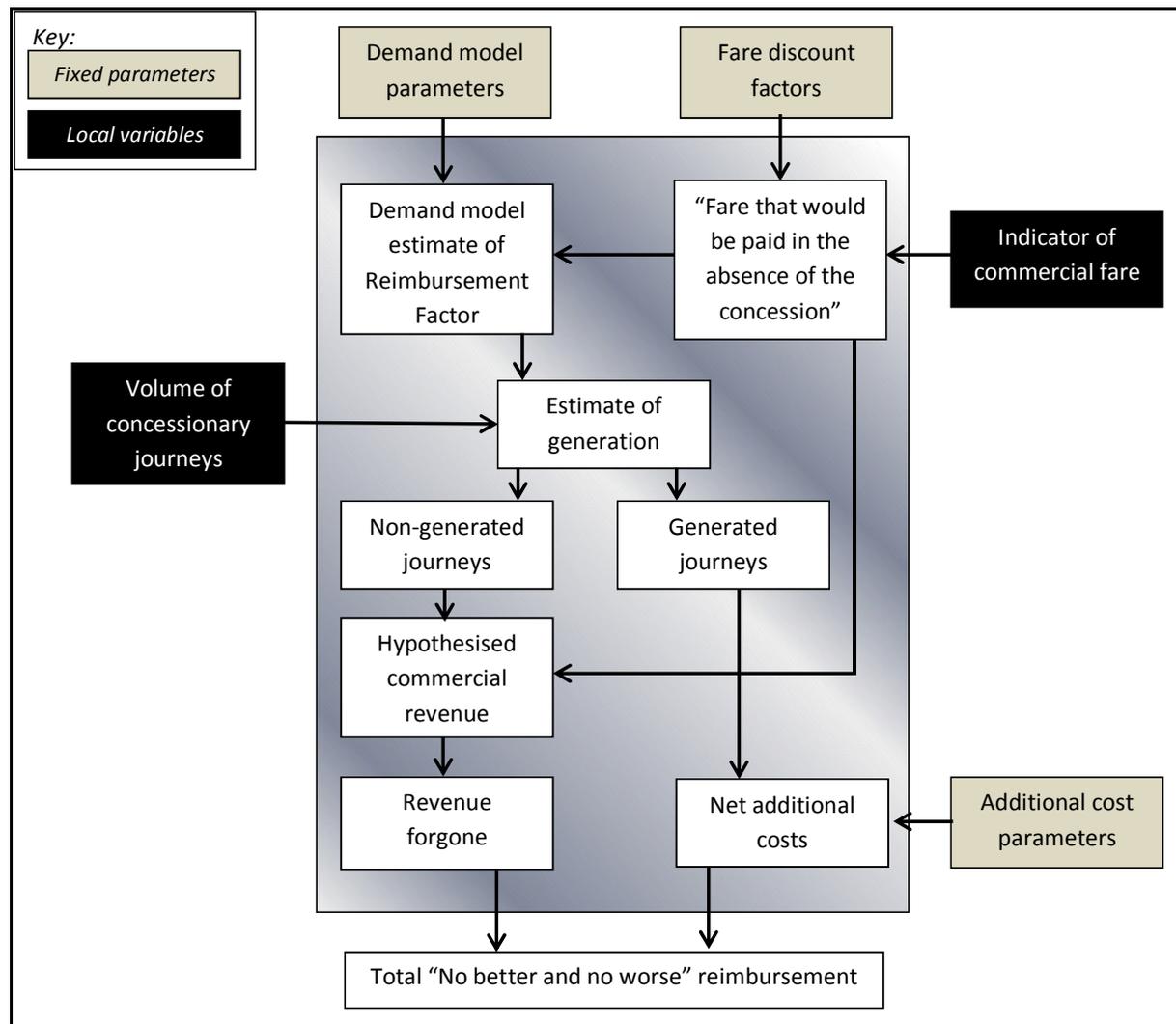
Since 2006 there have been many disputes between operators and TCAs, with arguments about principles, data and the interpretation of DfT guidelines. This is time-consuming and expensive and has led to a number of judicial reviews where parties have disagreed with appeal outcomes. As a result, DfT has probably been the subject of more judicial reviews than other Government Departments.

Over the period 2008-2010 Leeds University Institute for Transport Studies (ITS) carried out a major study for DfT, published in November 2010 by ITS as “Concessionary Travel: The Research Paper” at <http://www.dft.gov.uk/publications/research-into-the-reimbursement-of-concessionary-fares/>.

In November 2010 DfT published new guidance based on the ITS work, which took effect from April 2011 and seems to have resulted in far fewer appeals.

Andrew presented a simplified version of the reimbursement calculation shown in Figure 1. Each box in the diagram could be the subject of a PhD dissertation in its own right.

Figure 1: the reimbursement calculation



The ongoing inputs into the calculation process, variables typically established for an individual operator for a given month or a year, are:

- Some measure of the average fare
- an estimate of the volume of concessionary journeys

A core problem for many TCAs is that most of the information required can only be provided by the operators and is difficult to audit.

The reimbursement factor

This is defined as the proportion of concessionary trips that would “continue to be made in the absence of the concession”. It is implicitly a function of how trip numbers change with fares and hence determined by assumptions about:

- the shape of the demand curve
- sensitivity parameters and elasticities

The form of the demand model has been changed in response to changing modelling requirements.

Before free fares, constant elasticity models were common in which

Travel = K * Fare^{Elasticity} , where K is a constant

However, since the quantity of travel is not defined when Fare is zero, this functional form cannot be used for calculating generation from free fares.

Initially, negative exponential models were used, as in:

Travel = K * exp (- β * Fare) , where K and β are constants

These models give elasticity rising in direct proportion to fare, and hence a high elasticity (in absolute terms) at high fares.

The recommended method is now a “damped” form of the negative exponential:

Travel = K * exp (- β * Fare^λ) , where K, β and λ are constants

A variety of functional forms have been used in the past, including some based on generalised cost concepts, but the central role of DfT Guidance in determining the outcome of appeals has strongly pushed TCAs to adopting DfT recommendations.

Although there is widespread acceptance of the damped exponential functional form, there is less consensus on whether the DfT recommended method for calculating the Reimbursement Factor from the functional form is correct.

Parameter values and elasticities

The 2004 “black book” consolidated collection of data on elasticity values has provided a useful starting point but is relatively dated, and many of the results quoted are subject to a wide range of interpretation.

ITS analysed National Travel Survey (NTS) data, a willingness-to-pay (WTP) telephone survey and STATS 100A operator data, but the specific values recommended by ITS and adopted by DfT are from detailed analysis of trip data before and after free fares from four PTEs and seven County areas. The damped form of the curve simulates shifts in the demand curve associated with the change in pass take-up associated with the introduction of free fares.

Table 1 shows the resulting recommended parameter values, defined relative to fares at 2005-6 prices.

Table 1: DfT recommended parameter values

Area	Beta (β)	Lambda (λ)
PTE	-0.6161	0.7232
Non-PTE	-0.7436	0.6406

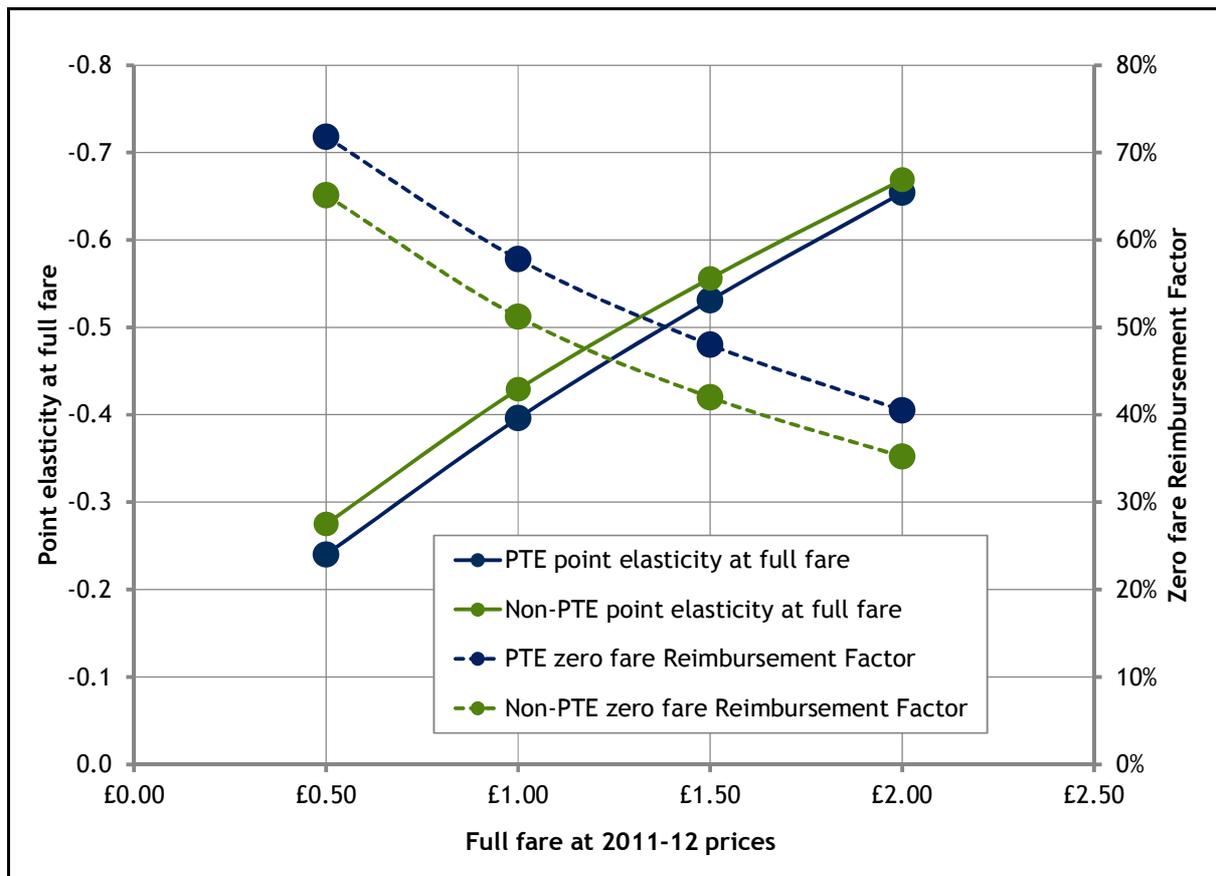
Table 2 shows the implied point elasticities at a range of fare levels, and the associated Reimbursement Factors, defined as the proportion of observed free-fare concessionary trips that it is estimated would continue to be made if passholders had to pay the given “full” fare.

Table 2: implied point elasticities and reimbursement factors

Area	Full fare at 2011-12 prices	£0.50	£1.00	£1.50	£2.00
		Full fare at 2005-6 prices	£0.42	£0.85	£1.27
PTE	Point elasticity at full fare	-0.240	-0.396	-0.531	-0.654
	Zero fare Reimbursement Factor	71.8%	57.8%	48.0%	40.5%
Non-PTE	Point elasticity at full fare	-0.275	-0.429	-0.556	-0.669
	Zero fare Reimbursement Factor	65.1%	51.2%	42.0%	35.2%

Figure 2 overleaf shows the principal data from Table 2 graphically.

Figure 2: implied point elasticities and reimbursement factors



Average fares

Reimbursement is driven by “the average fare per trip that would have been paid by a concessionary passholder in the absence of the scheme”. This is typically based on some measure of the cash fare, modified by a discount factor to reflect the likely take-up of non-cash fares such as day and period tickets which are increasingly important relative to cash. This raises a number of practical issues:

- Measuring the relevant cash fare in a robust and auditable way, when the only data source is the operator
- Estimating the take-up of daily and weekly “discount” tickets
- Limited data on the trips made with “discount” tickets

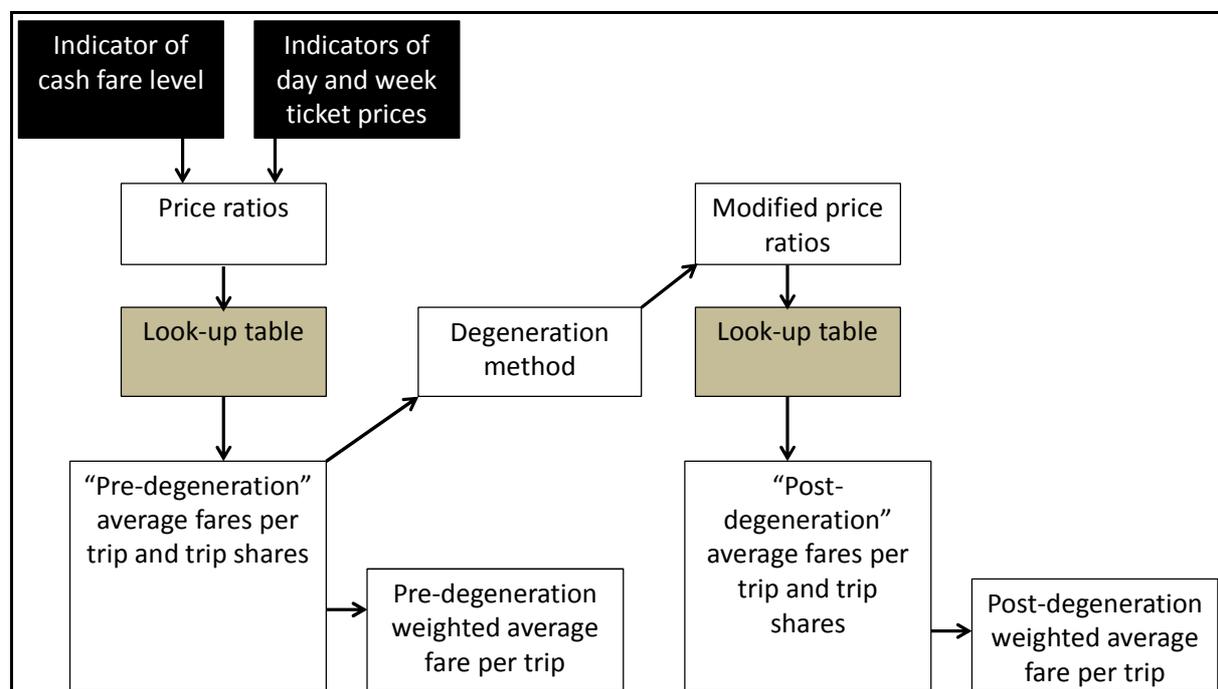
The overall average fare can be calculated from the weighted average of the average fare per trip for each fare type, weighted by the number of trips made with each fare type. However, both the average fare per trip and the relative usage of each fare type depend on the relative prices of each fare type.

Given the lack of hard data on use of non-cash fares, it is dangerous to rely on “rules of thumb”, such as “three trips per day ticket”, and there is a need to draw only on auditable data. The recommended method now uses:

- A look-up table driven by the relative price of tickets, in which...
- ... the look-up table is derived from smartcard data on observed free fare concessionary trips.

The overall process is summarised in Figure 3 below.

Figure 3: estimating discounted fares



Additional costs

Operators are entitled to be reimbursed for additional costs “necessarily incurred as a consequence of the concession”, but these are difficult to demonstrate. ITS developed a detailed methodology with the following cost components based on unit costs derived from analysis of STATS 100A data:

- Scheme administration costs: these are modest, and only occasionally charged
- Marginal operating costs, for which an average rate per generated passenger is recommended and widely applied

- Marginal capacity costs, greatly disputed because, while a detailed method is recommended, they require detailed locally-specific data
- Peak vehicle requirement costs, which some operators seek, and for which ad hoc methodologies apply, but are rarely justified

TECHNICAL NUGGETS

Smartcard analysis

The look-up table for average fares referred to in Figure 3 is derived from an analysis of detailed trip records combined with passholder information.

Smartcards have a number of advantages:

- They provide relatively complete data on all trips in the area by all passholders
- They provide masses of data: five weeks of 2009 data (now being extended) in four Lancashire Districts identified with 90,000 passholders making 500,000 trips
- They enable access to distributions of trip frequency by passholder
- In contrast to survey data, they are not coloured by response bias

Table 3 summarises the trip frequency distribution seen in the five weeks of Lancashire data.

Table 3: distribution of trips by frequency

Trips per week		Passholders		Trips	
Range	Mean	Number	Proportion	Number	Proportion
0		49,397	56.2%		
0-1	0.53	14,854	16.9%	39,139	6.7%
1-5	2.60	16,270	18.5%	211,193	36.0%
5-15	8.15	6,787	7.7%	276,585	47.1%
15-20	17.13	420	0.5%	35,983	6.1%
20+	24.72	196	0.2%	24,225	4.1%

Andrew noted that:

- 56.2% of passholders make no trips, and some may have no useful bus service
- 8.4% of passholders make more than 50% of all trips
- 2.4% of passholders make more than 25% of all trips

Figure 4 shows the average trip rates in each of these bands. The area under the line shows the proportion of total trips in each band.

Figure 4: distribution of trips by frequency

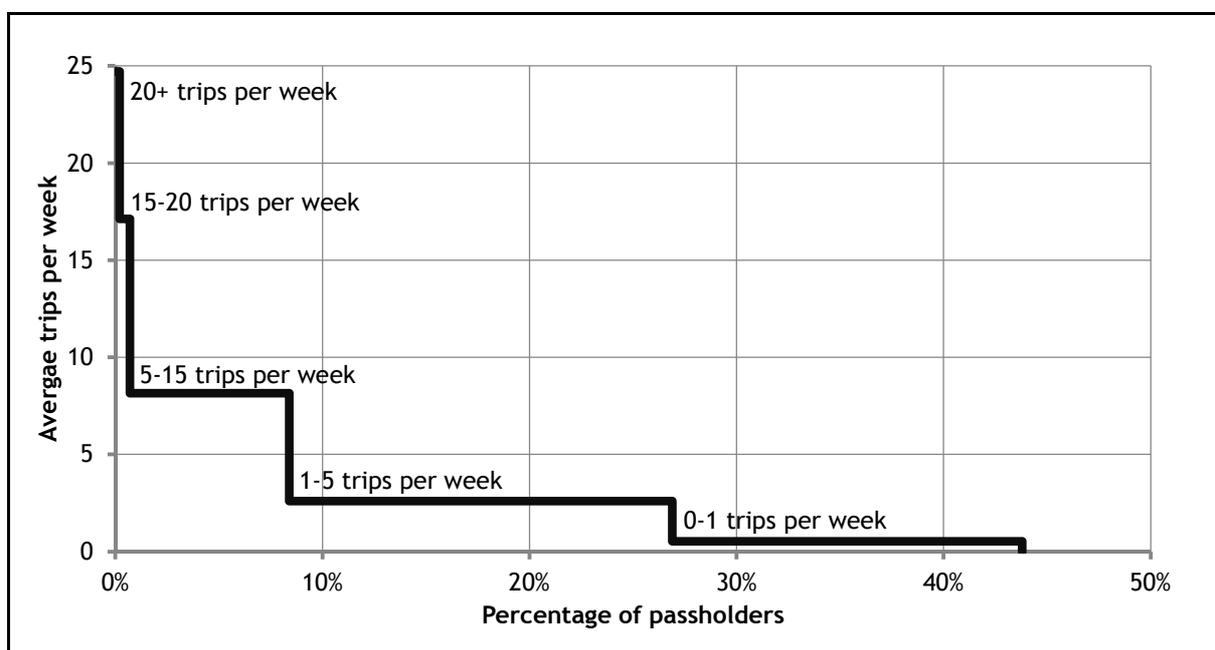


Table 4 aggregates passholders into non-users, infrequent users and frequent users, above 10 trips per week, in different sizes of settlement.

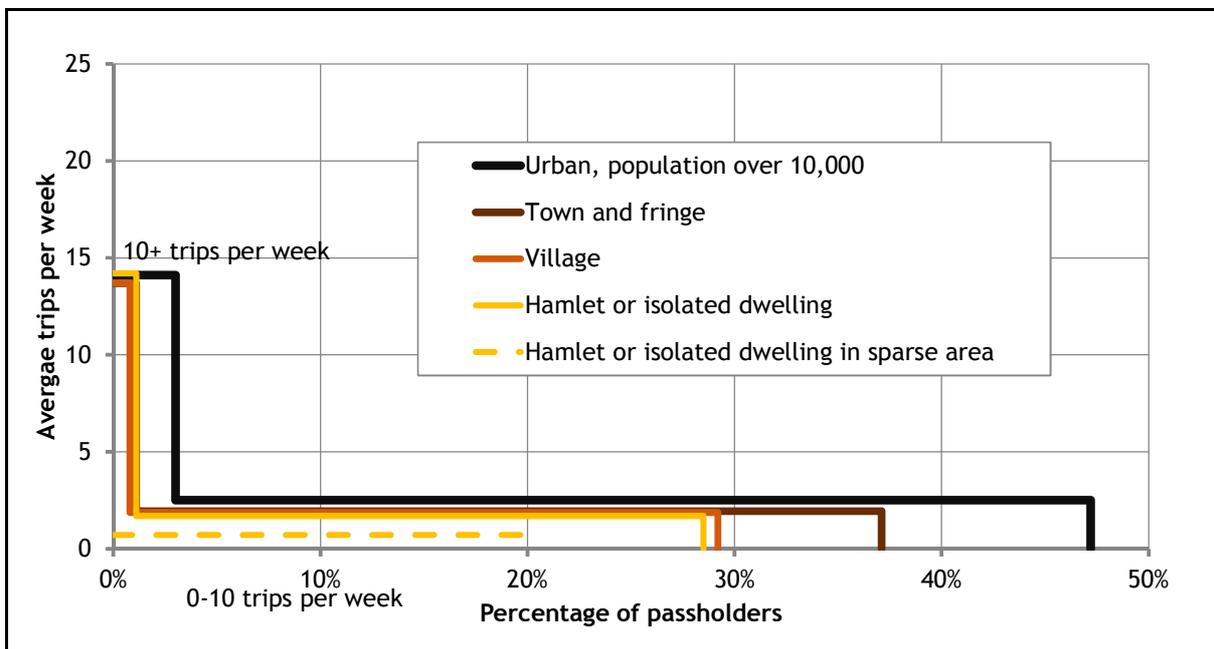
It and Figure 5 show that:

- Frequent users averaged around 14 trips at all sizes of settlement
- The proportion of frequent use declined in smaller settlements and was zero in sparse areas
- Both the proportion of infrequent users and the average trips they made declined in smaller settlements

Table 4: distribution of trips by frequency and settlement size

	Overall average	Surrounded by less sparse area				Surrounded by sparse area
		Urban, 10,000+	Town & fringe	Village	Hamlet and isolated dwelling	
Proportion of passholders by number of trips per week						
0	56.2%	52.8%	62.9%	70.8%	71.5%	80.2%
0-10	41.3%	44.2%	36%	28.4%	27.4%	19.8%
10+	2.5%	3.0%	1.1%	0.8%	1.1%	Nil
Average trips per week						
All	1.336	1.531	0.850	0.644	0.620	0.141
0-10	2.382	2.505	1.943	1.881	1.692	0.712
10+	14.09	14.12	13.70	13.71	14.21	

Figure 5: distribution of trips by frequency and settlement size



Summarising the analysis, over half of passholders do not use their passes, and the benefits are concentrated in urban areas and among frequent users. The average of 1.34 trips per week represents neither the 56% who do not use their passes, nor the 44% who make more than twice this number, nor the minority making large numbers of trips.

This raises some issues:

- What distinguishes frequent users from others?
- How do frequent, infrequent and non-users react to policy changes and other exogenous stimuli?
- Are low rural trip rates due to low bus availability of other factors, and if the latter, what effect will different policy measures have?
- Should mode choice models have a “no bus available” segment?

For example, when fares change:

- Do all passholders change trip making by the same proportion?
- Does the frequency distribution become more or less skewed?

Marginal capacity costs

The proposition is that operators provide additional capacity to accommodate generated concessionary passengers, but this begs the question of how demand influences supply and vice versa. The ITS/DfT methodology uses a “Mohring factor” which implies a service frequency elasticity to trip numbers of +0.6.

However, many TCAs and PTEs are not convinced. Some of the latter have access to data on the frequency of crowded buses, based on a sample of 10,000 departures, shown in Figure 6.

If Figure 6 is assumed to reveal evidence of operator crowding policies, it can be used to simulate the situation without generated concessionary travel. If the “tail” of the distribution is interpreted as the operator policy on crowding levels at a given level of demand, then the implied supply without generated demand can be estimated, as in Figure 7.

PTES would argue that, without generated passengers, supply would fall to the red dotted line, which can be converted into a reduction in total bus miles operated. This suggests that the additional supply provided in response to generated travel is very much less than the Mohring factor.

Figure 6: PTE analysis of bus crowding

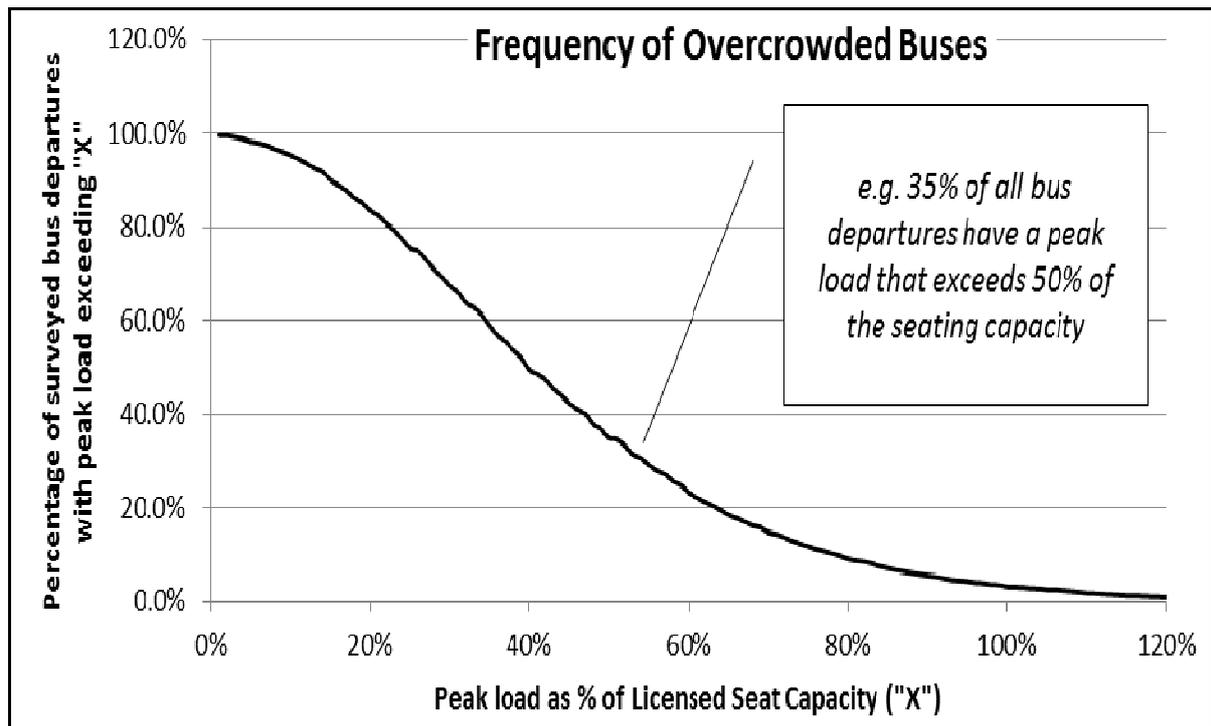
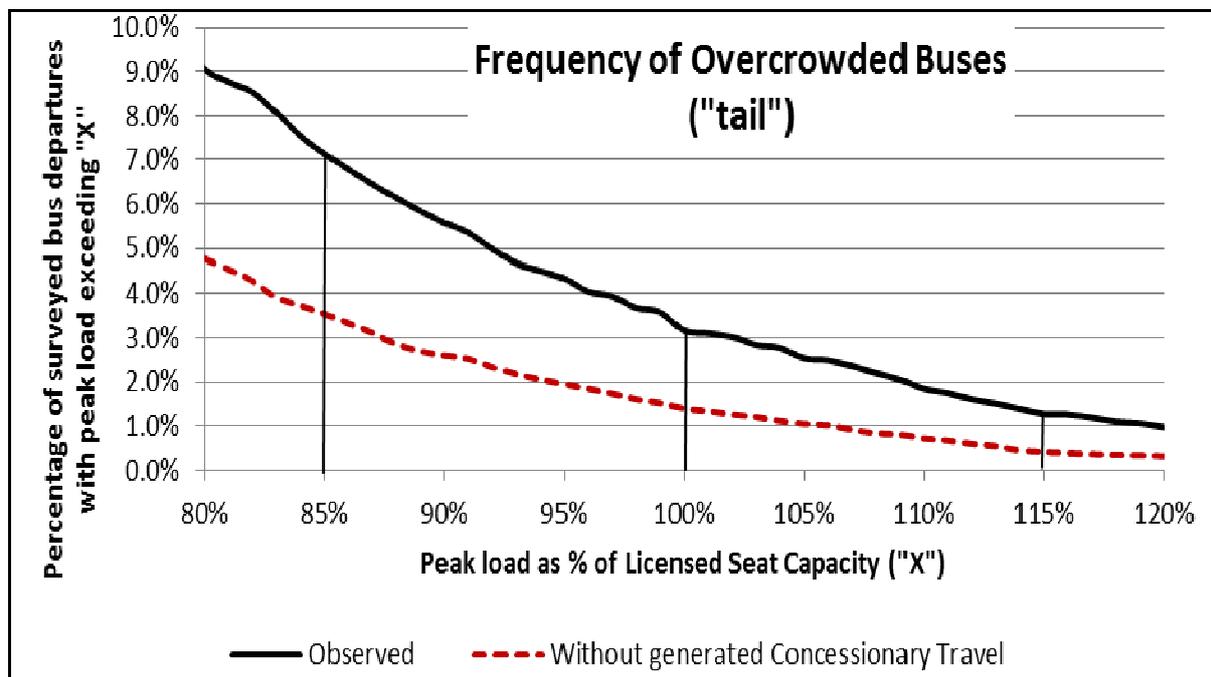


Figure 7: Estimating supply without generated concessionary travel



CONCLUSIONS

In conclusion, Andrew noted that:

- Rapid policy changes in concessionary fares have meant that analytical methods have struggled to keep up
- Introduction of statutory free travel has had significant impacts on politicians, public spending, local government and bus operators
- Free travel has had a big impact on many passholders, but many intended beneficiaries are unable or unwilling to use it
- Reimbursement principles create many technical challenges and the solutions are subject to intense scrutiny
- Substantial datasets offer great research potential, but are politically and commercially sensitive to the key players

DISCUSSION

Peter White (University of Westminster) noted that many aged 60 are still in employment and, where there are no AM peak restrictions, can commute. These may be part of the core high frequency, and smartcard data could presumably reveal the timing of frequent users' travel. Andrew agreed. There was little variation in trip rate with age, with the peak trip rate being at 75-85, but this was a cross-sectional average, and it would be desirable to dig deeper. He also noted that eligibility is now being deferred by one month every two months.

John Cartledge (London TravelWatch) agreed that there were political sensitivities. When boundary changes were proposed around the GLC area, the only consistent objection to transfer to a non-London authority was a feared loss of Freedom Passes. He also noted that car availability may be a factor in bus use: when passes became free the take-up rate rose but the usage rate did not change. However, policy was a mess: why should government help the elderly travelling any distance but schoolchildren only at longer distances? Andrew agreed and said he had looked in vain for a proper rationale.

John Bates (Independent Consultant) considered it a shame that data was not being analysed and noted that the elderly and the disabled were distinct groups and markets. He also noted that bus drivers on cross-border routes record only boarding locations, and not destinations, so there is no clear identification of journey length or border crossings.

Andrew agreed that further analysis would be good, but the key players have no interest in going further: data is very sensitive to the local interested parties. Analysis is only possible where trust is high and no possible commercial interest can be identified. Recording of passenger destination varies widely, but is often irrelevant to the reimbursement calculation. Few TCAs feel that a passenger response would be reliable.

Tom Beck (WSP) wondered if the recent fall in the number of appeals might conceal greater negotiation. Andrew acknowledged that this was possible, but the guidance has removed uncertainty and hence the value contested by either appeal or negotiation. **John Cartledge** noted that, with the move from Districts to Counties, there are fewer TCAs. Andrew pointed out that many had already agreed County-wide schemes.

Roger Mackett (University College London) asked what would happen if the concession was taken away. He had heard of people using the travel concession to work as volunteers at hospitals, and its removal might therefore add costs to the NHS. Andrew agreed that the effects would be complex and that the value of the travel was not well understood: he knew a 91-year-old who used the concession to work in an Oxfam shop.

Vinal Karania (Department for Transport) said that there had been an evaluation of the 2006 change from local to national travel, but not of the more recent changes, which are still being examined.

Tom Worsley noted that DfT tends to study capital expenditure but not revenue spend.

Stephen Bennett (Retired) asked what evidence there was of the effect on other modes. Andrew was unsure, and circumstances vary. Greater Manchester allows free travel on Metrolink, but this is discretionary, and most PTEs require rail franchisees to give passholders free travel, with a reimbursement mechanism. Some TCAs give a choice between a bus pass and a rail discount.

John Cartledge noted that the taxi trade had lost out when local authorities could no longer issue tokens and had to issue passes.

Andrew's closing comment was that the big issue looking forward was the long term sustainability of the free concession in the context of cuts in local authority funding.

Report by Dick Dunmore

Lorry Road User Charging

Keith Buchan, MTRU

Arup

26 October 2011

INTRODUCTION

Lorry road user charging remains a current issue of interest to policy-makers and economists. The EU vignette has recently been amended, with compliant systems of charging having been in place in Germany for the past five years and in Switzerland for ten. Charging can improve the efficiency of the industry and ensure that HGVs pay their external costs.

STRUCTURE OF THE INDUSTRY AND RECENT TRENDS

The road haulage sector is split between the own account sector and public hauliers. The former are generally part of the logistics chain, moving goods as required from factories and plants through distribution depots to shops, often as part of a “just-in-time” delivery process. Own account operators can ensure efficiently high load factors in the outward direction and are increasingly succeeding in carrying goods on the return leg. The public haulage sector is characterised by a small number of large operators and a large number of small operators.

The sector is very competitive, with low margins and a tendency to buy the largest vehicles so as to avoid turning away a load. The shift to larger vehicles in both sectors of the industry is illustrated in Figure 1, showing the stock of articulated vehicles by year and gross vehicle weight.

Vehicle kilometres operated by public haulier fell by more than 20% between 2007 and 2009, in contrast to slow but continuing growth in the own account sector. Tonne kilometres per vehicle kilometre have been falling over the past 20 years, in part because of a shift to transporting more goods on pallets, or in cages, which take up more space. The additional capacity delivered through the shift to larger vehicles has not reduced the ratio of vehicle kilometres to tonne kilometres, resulting in increased efficiency through the use of fewer lorries, in the way that was anticipated.

Figure 1: numbers of articulated GB-registered heavy good vehicles

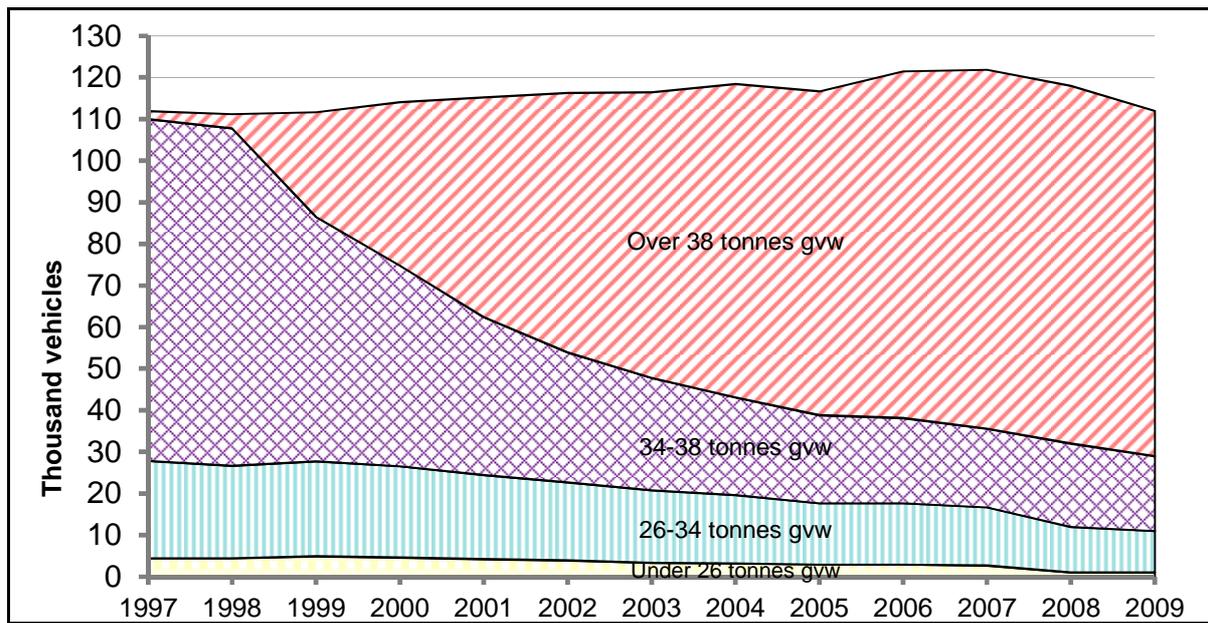
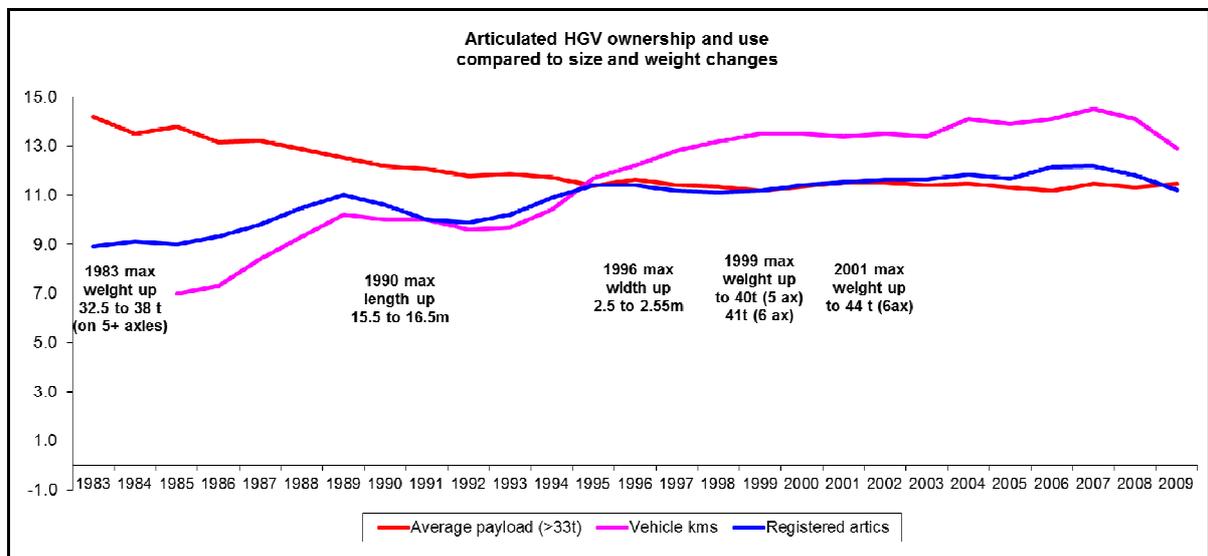


Figure 2 shows how, as maximum permitted weights increased, payloads fell while vehicle kilometres rose.

Figure 2: maximum permitted weight, payload and vehicle kilometres



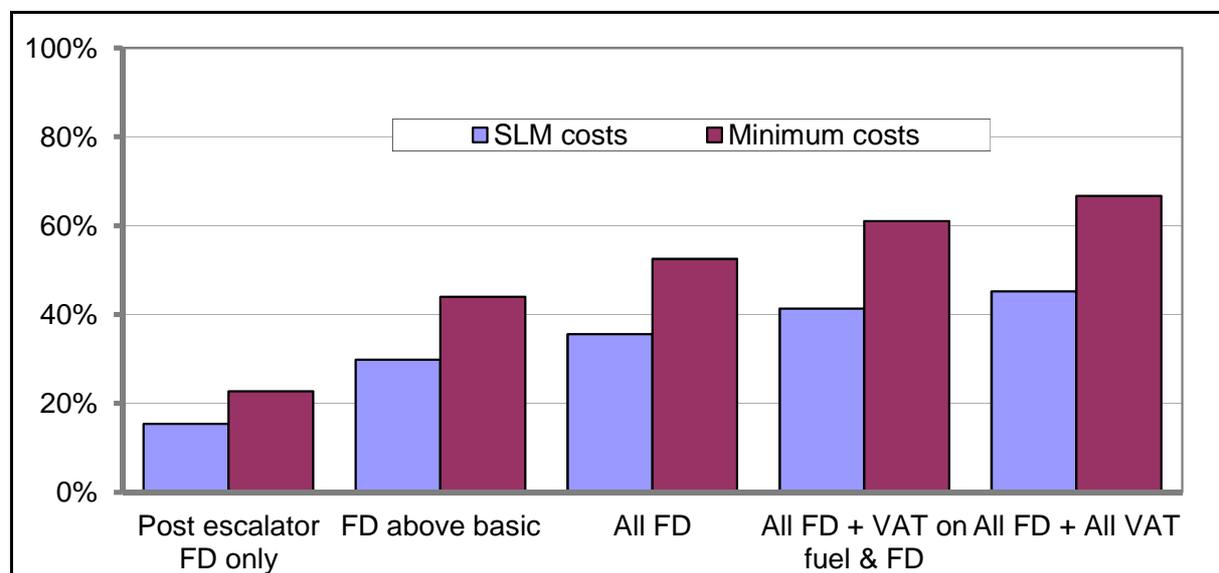
EXTERNAL COSTS

There are several sources of estimates of the external costs of heavy goods vehicles. Taking estimates of the cost per vehicle kilometre estimated from studies of marginal external costs, and applying these to the GB vehicle kilometre totals, the range from three recent studies gives a national annual cost varying from £7.1 billion to £23.3 billion.

Externalities included in the DfT's sensitive lorry miles calculations, which fall towards the lower end of the range, include the costs of accidents, noise, pollution, climate change, infrastructure, congestion and a number of unquantified costs. Among the unquantified costs are factors such as fear of accidents, driver frustration, severance and visual intrusion, perceptions of risk discouraging cyclists and walkers and damage to the substructure of the road and road vibration.

The present system of taxation is not a good way of recovering external costs from HGV operators. VED levels are now low and in any case bear no relationship to vehicle use. Estimating the contribution of fuel tax to external costs presents certain difficulties in establishing the extent to which fuel duty, like duty on tobacco and alcohol, forms part of general taxation, and the extent to which it is a transport specific tax. Various studies have made different assumptions, with some counting all fuel duty, some just the escalator, and others have compared road fuel duty with the minimum rate of duty on fuel, as used for non-road purposes such as agriculture. Figure 3 shows the percentage of external costs covered under two assumptions about the level of external costs and under five assumptions about the amount of tax on fuel which can be attributed to paying for externalities.

Figure 3: proportion of HGV costs covered under different assumptions



Effective policies for internalising external costs through fuel duty in Europe are constrained by variations between member states in the levels of tax on diesel, leading to fuel tourism. The UK has the highest fuel tax, in Europe with Luxembourg the lowest, thus generating “tank-tourism”. Since taxes on fuel are a matter for individual member states to decide on, an alternative means of charging for externalities is required.

OPTIONS FOR LORRY ROAD USER CHARGING

Charging mechanisms need to reflect, to a greater or lesser degree, the time at which or the duration for which the vehicle is operating, since external costs vary to some extent both by time of day/day of the week and by duration of use or by mileage travelled. Inclusion of the distance travelled, the road type and place, whether urban or rural, congested or not, is a further desirable feature. While an approximation of congestion costs can be made on the basis of a scheme that provides a fixed tariff by road type, time of day and area to reflect typical levels of congestion, a dynamic real time charging system would have the capability to charge lorries for the congestion actually caused on the basis of the speeds actually achieved. There is thus a wide range of options which vary according the level of complexity, with the more complex options better targeted on the specific costs of congestion and road type. The simplest options are based on a charge per time period (day, month, and year) or by distance travelled, with differences in the charge between vehicle types according to the vehicle's weight and environmental standard.

The German toll or "Maut" is charged on all vehicles over 12 tonnes gross vehicle weight (gvw) on motorways and some alternative routes. Vehicles carry an on-board unit which transmits information to the control centre which then bills the vehicle operators. Charges range between 15.5c and 20.3c per kilometre, raising around €3 billion per annum. Empty vehicles are charged the same rates as full ones. The increase in HGV traffic crossing Germany from Eastern Europe, carrying flows which prior to 1989 had been mainly on rail, was one of the reasons for the introduction of the "Maut". Over the past decade rail freight tonne kilometres have increased at more than double the rate of road freight in Germany although the extent to which the "Maut" has contributed to this remains uncertain because the trends started several years before the implementation of the charges. However, unlike the UK, where there has been little change in the amount of empty running over the past decade, empty running in Germany has declined.

The Swiss scheme is broadly similar to the German scheme and distinguishes by weight as it covers vehicles down to 3.5 tonnes. It was introduced as part of a package of measures which included an increase in the maximum permitted gvw for vehicles operating through or within Switzerland and the construction of additional transalpine rail capacity. The number of HGVs passing through Switzerland declined after the introduction of the scheme, although road tonne kilometres continued to increase, as did rail tonne kilometres. A feature of the Swiss scheme is the visibility of the on-board unit to other HGV drivers which lights up

when operating and makes very obvious the cases in which a driver has failed to turn on the unit.

CONCLUSIONS

A Swiss type weight and distance based scheme would seem the best option for Europe, with some provision to reimburse operators to make the package compliant with the EU requirements, possible allocating these funds to the purchase of lower emission vehicles and driver training. The current UK proposals are for a time-based system, which might well cost more to implement than it would raise in revenues, and would not negate the benefits to the operator of tank tourism.

DISCUSSION

Peter Gordon (Editor, The Transport Economist) asked about the opportunity for rebating or reimbursing fuel duty. Keith explained that the objective of road user charging was to internalised external costs rather than providing an alternative means of raising the same net revenue. The UK scheme as proposed some ten years ago would not have been allowed by the EU as the method of reimbursing operators for fuel duty paid would be seen as discriminating against non-UK operators.

David Starkie (independent consultant) asked about the political momentum behind the 2000 UK scheme, which had evaporated once it became perceived as a pilot for universal road user charging. Keith suggested that it might indeed have provided evidence and experience for a universal scheme, although the EU's objections would have prevented its implementation. In the discussion additional concerns about the 2000 proposal were raised, including the extent to which any congestion benefits would be reduced or eliminated by growth in other road traffic generated by the reduction in congestion.

Dick Dunmore (Steer Davies Gleave) suggested that part of the reduction in empty running in Germany might be accounted for by an increasing tendency for manufacturers to take back packaging and materials for recycling. However, as Keith explained, there remains a large amount of empty running. In order to draw consumers' attention to transport costs, France is considering separating out haulage costs and showing these as an item on consumers' bills. Dick then asked about economies of scale in the road haulage sector, noting that firms did not seem very responsive to cost changes and that information systems set

up to match loads to truck movements, with the aim of reducing empty running, were rarely used.

John Cartledge (London TravelWatch) asked about the political motivation in Brussels to move forward on charging. Keith suggested that there was a coincidence of interests among key member states, who wanted to find a means of recovering some of the costs of the increasing volume of trans-national HGV traffic, with the motivation coming from national interests. Charging should help to increase load factors as well as to internalise external costs. John followed up his question by asking whether politicians in other member states were less concerned about lorry road user charging being perceived as a pilot for universal road user charging. Keith noted that lorry road user charging was approved through a vote in Switzerland, although others noted that charging was part of a package which included new Alpine tunnels, which might influence the popularity of the scheme.

David Starkie asked about the incentive in the German scheme that might have incentivised hauliers to increase load factors. John Bates (John Bates Services) noted that the increase in load factors occurred several years before the charging scheme was implemented. Keith suggested that, because the German charge is levied on gross vehicle weight, the penalty on non-remunerative empty running is increased and this encourages operators to find return loads.

Steve Lowe (MVA Consultancy) asked how a lorry road user charging scheme might be evaluated. Keith proposed that a successful scheme would bring external costs into line with the charge and reduce tonne kilometres per vehicle kilometre, thus demonstrating an increase in this measure of efficiency. There was some debate, which focused on the extent to which empty running was an indicator of inefficiency, and about whether efficiency could be left to the market as at present or whether the charge would represent a potential for improvement.

Keith summarised by suggesting that policy makers should not become too concerned with getting the charge “exactly right”. It was better to make progress and implement a charge than to delay so as to make time for further analysis.

Jeremy Drew thanked Keith for his presentation and stimulating responses to the questions and concluded the meeting.

Reviews

The views expressed are those of the reviewer and should not be attributed to the Transport Economists' Group

Shaping Transport Policy, Ruud Filarski (in cooperation with Gijs Mom), Den Haag, Sdu Uitgevers, 2011, price €41.50

This historical review and assessment of transport policies in seven countries (Great Britain, Belgium, France, Germany, the Netherlands, Switzerland and the USA) is the result of a study commissioned in 2005 by the Dutch Ministry of Infrastructure and the Environment (Rijkswaterstaat), with particular support from Bert Toussaint, the Ministry's historian - a worthwhile appointment: does the DfT have a historian? The study's aim was to gain an understanding of the effectiveness of different policy instruments, as an aid to governments in transport policy implementation. The sub-title "Two centuries of struggle between the public and private sector – A comparative perspective" accurately defines the authors' approach. The work covers the emergence of railways (1830-1910), tramways (1870-1920), the car and national road networks (1900-40), the bus industry (1920-40), road freight (1920-2005) and the era of mass motorisation (1950-2008), with reference also to the role of the state in policy development and regulation.

Four main policy areas are examined: structuring an effective transport network; organising rail transport; creating fair competition; and combating the environmental impact of the car. The evolution of these policies over time, measures taken by governments to address them, and the long-term impacts of these measures are each considered. The work shows evidence of thorough and wide-ranging research, there being numerous tables of comparative statistics and 45 pages of notes and references.

The book has two great strengths; the seldom-performed comparison of policies between countries; and the authors' ability to summarise situations in simple and effective language. For example "Compared with the European railways, the early US rail links were primitive and cheaply built, and operated with insufficient care" (p7) and "The nationwide haulage strikes in Italy in December 2007, which plunged the country into a supply crisis in only four days, showed that small-scale companies such as these can give rise to a highly explosive situation" (p.175). The bias towards coverage of Dutch developments and

examples can be forgiven, in view of the study's pedigree, and the other six countries are by no means ignored. A message the authors are particularly keen to convey is the continuing relevance today of many of the issues and dilemmas that faced governments in the past – a message politicians and regulators would do well to appreciate.

The numerous tables are indicative of wide-ranging research, that in the authors' own publications suggesting extensive use of original material as well as a vast array of secondary sources. The simple tabulations such as those in chapter 2, the emergence of the railways 1830-1910, must have taken many hours each to compile. Lengths of line, related to populations and land surface areas, and average fares, show how the railway revolution started in Britain, and the United States, with other nations soon catching up and overtaking. In 1850 Belgium, France, Germany, the Netherlands and, in particular Switzerland, with only 25 route-kilometres, all lagged behind Britain (9,800 kilometres) and the USA (14,500 kilometres). By 1880 the scale of the French and German networks approximately equalled Britain's and that of the USA was six times larger. The Swiss network had grown to 2,500 kilometres. The complaint of high rail fares in Britain is nothing new; in 1850 they were already some 50% higher than the average in the other countries in the sample, and remained constant whilst those in other countries declined.

While many readers will be reasonably familiar with the situation in their own country, the parallel presentation of international evidence will be revealing. It is therefore of particular interest that the authors have been able to discuss a series of key questions that apply across the board (p204). Should governments be responsible for establishing coherent rail and road networks, or should the task be left to regional/local authorities, or to market forces? To what extent should railways be regulated by governments? Should governments intervene to establish equal competitive conditions, or to promote particular modes? And a question that has risen up the ranks of importance in recent years: to what extent should governments intervene to reduce the environmental impacts of transport, especially of cars?

In their conclusions the authors remind the reader of the study's principal purpose; to advise and inform policy-makers on any lessons to be taken forward from past experience. They set out three propositions: that policymakers need to develop and nurture a thorough understanding of traffic and transport; that they must be in a position to apply this knowledge in an unprejudiced manner; and that transport policies can only be effective if supported by society at large – so policymakers must work closely with the public, the business community and the critics.

Your reviewer has no hesitation in recommending this work to transport economists as a comprehensive, balanced, well presented, informative and eminently readable contribution to the literature on transport policy.

Reviewed by Martin Higginson, Associate, Institute of Railway Studies & Transport History, York University / National Railway Museum.

**Histoire des chemins de fer en France : 1740-1883, François Caron,
Librairie Arthène Fayard - June 1997
(700 pages in French, available through Amazon)**

Anyone, such as myself, looking down from the deck of a cross-Channel ferry arriving in Calais, Boulogne or Dieppe in the 1970s, was immediately struck by how different the railway on the quayside appeared to that in Britain. The initial impression of difference was reinforced when one got on board the train and sped towards Paris or wherever.

This book, the first volume of a two-part history, goes a long way to explaining the origins of those differences and why French railways are the way they are today. The author is Professor of Economic and Technical History at the Sorbonne (University of Paris IV), is Secretary General of the Association pour l'histoire du chemin de fer en France (AHICF - a highly academic group) and created the Centre de recherche en histoire de l'innovation (CRHI) at the Sorbonne.

Whilst the origins of this book can be traced to Professor Caron's doctoral thesis on the history of the Compagnie du chemin de fer du Nord (North Railway Company), the work covers and draws examples from the whole of the country and a variety of railway companies. As might be expected from the author's current position and involvements, there is a very strong emphasis on the political, economic and business aspects of railway development, in addition to what Caron refers to as la Science ferroviare or la Science de réseaux (a very French conceptual approach to railway or network operations which we in Britain might treat in rather more pragmatic manner).

The starting date of 1740 for the story (the other meaning of l'histoire) is not a misprint. Caron begins by providing an extensive account of the development of road and canal transport in the pre-railway era. Unlike in the UK this was very centrally directed, largely for internal political and security reasons, and led to the evolution of a powerful group of engineers, the corps des Ponts et Chaussées. Creation of a comprehensive network of well-engineered roads and canals continued

both under Napoleon and the restored monarchy. Caron regards this, alongside economic and geographic factors, as one of the main contributory elements leading to the relatively late and slow development of railways in France compared with its Belgian and German neighbours. Interestingly, completion of canal projects was a requirement placed on certain railway undertakings, particularly in the south.

Over time the corps des Ponts et Chaussées became closely associated with not just technical but also political decision-making by the state and had significant influence over the development of the railway network. Indeed echoes of its policies can be seen in the development of today's TGV network. Caron covers these relationships between engineers, politicians and financiers in some depth. In particular he frequently refers to the ever-present tensions between those who wished to see as direct routes as possible between Paris and the major cities or ports and those interested in better serving smaller intermediate communities on route. These different routes tend to be characterised as *tracés des plateaux* and *tracés des vallées* respectively. Here the reader is also constantly reminded that France is a very large country, with its major centres of population much more widely separated from each other than in the UK.

The continuing and growing power of the technocrats was in part a result of the repeated major political and social upheavals experienced in France during the period. This pattern of periodic political upheavals was hardly conducive to the steady development of complex capital intensive industries, such as railways, through the action of entrepreneurs as in Britain or the USA. Before the revolution in 1789, France was an absolute monarchy - the so-called Ancien Régime. Between then and the establishment of the Third Republic in 1875 the country was governed by two Emperors, three Kings, two Republics and a Commune, each of which adopted very different approaches to the nation's economy. Furthermore, the changes in political regime in 1804, 1815, 1830, 1848, 1851 and 1871 were each the result of some form of revolutionary action or a coup d'état, both of which impacted on industry.

As a consequence, there were continual intellectual tensions and frequent changes in government policy over the role of competition between companies and how extensive the railway network should be given many areas of sparse population. Amalgamations of smaller companies into six large quasi-monopoly groups (Paris-Orléans, Ouest, Nord, Est, Paris à Lyon et à la Méditerranée, and Midi) occurred relatively early to improve financial performance. Later, demands for more competition and yet another change in government led to the state fostering new companies and alternative routes. Inevitably these failed

to be viable and ultimately resulted in the state becoming the seventh major railway operator (the État). Caron covers each twist and turn in this story, together with the parts played by the various protagonists, in perhaps more detail than a general reader would wish.

As the book makes clear, the capital market in France was not sufficiently well-developed to finance other than very local railways. There was simply no appetite amongst the general population for putting their not-inconsiderable savings towards buying shares, and the landed wealthy had been wiped out in the aftermath of the 1789 revolution. Hence, the private companies came to rely heavily on borrowing from banks, with the inevitable consequences when faced with high interest charges during periods of revenue downturn after previous periods of overoptimistic expansion. The large groups required repeated rescues by the state. This led to increasing government involvement and interference in the day-to-day affairs of all the enterprises.

Government involvement also led to an emphasis on network extensions to serve local constituencies at the expense of improvements to existing routes and facilities to meet growing traffic needs, a policy which was to have disastrous consequences for French troop and equipment movements when the Franco-Prussian war broke out in 1870.

Volume 1 ends with the 1883 Convention which, following the economic crisis of 1882, fundamentally redefined previous arrangements between the state and the companies. Only then did French railway companies achieve a reasonably firm financial footing, essentially based on a state guarantee, and thus feel confident in adopting the low fares/high volume strategies already much in evidence across the Channel.

For anyone with a sound working knowledge of business French, this book is a worthwhile challenge. Caron writes in fairly straightforward French, without the long convoluted sentences typical of more literary works, although this reader did find having a comprehensive dictionary to hand very helpful with the more obtuse expressions (the Oxford Concise proved invaluable), and needed to do some mugging up on 19th century French history. However, I am still at a loss to understand fully the economic philosophy of Monsieur Saint-Simon's followers to which Caron makes repeated reference.

The drawbacks to the book are a poor index, which covers only people not companies, places or events, and a lack of decent maps.

Reviewed by Gregory Marchant

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The Transport Economists' Group, formed in 1973, provides a forum for people involved in transport economics to meet regularly and discuss matters of mutual interest. Membership is open to economists working in transport and others whose work is connected with transport economics.

The aim of the Group is to improve the quality of transport management, planning and decision making by promoting lectures, discussions and publications related to the economics of transport and of the environment within which the industry functions.

Meetings are held every month from September to June (except December) at Arup's Central London HQ at 13 Fitzroy Street. The meetings consist of short papers presented by speakers, drawn from both within the Group's membership and elsewhere, followed by discussion.

The Group's Journal, "The Transport Economist", is published three times a year reporting on meetings and other activities of the Group. It reviews recent publications of interest and contains papers or short articles from members. The Editor welcomes contributions for inclusion in the journal, and can be contacted at petersgordon@blueyonder.co.uk.

The current membership of over 150 covers a wide range of transport modes and types of organisation. Members are drawn from transport operators, consultants, universities, local and central government and manufacturing industry. All members are provided with a full membership list, updated annually, which serves as a useful source of contacts within the profession. Applications from people in all sectors are welcome.

Applications for membership should be made on a form obtainable from the Membership Secretary at gregorymarchant.teg@btinternet.com.

Alternatively, an application form can be downloaded from the Group's website: www.transecongroup.org.

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Details of meetings are provided on our website at

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