

The Transport Economist

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Transport Economists'
Group

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Spring 2007



TEG TRANSPORT ECONOMISTS' GROUP

PROGRAMME 2007

Meetings of the Transport Economists' Group are open to members and guests.

Meetings are held at 5.30 for 6 p.m. and finish around 7.30 p.m. They are to be held at Arup's head office in London, 13 Fitzroy Street, W1, which is near Euston Station.

Wednesday 28 March	5 pm	Annual General Meeting
	6 pm	Transport appraisal in a devolved Scotland <i>Iain Docherty, University of Glasgow</i>
Wednesday 25 April		European rail freight policy – liberalisation or dirigisme? <i>Alan Bennett, Steer Davies Gleave</i>
Wednesday 23 May		The costs and benefits of urban agglomerations <i>Dr Daniel Graham, Imperial College, London</i>
Wednesday 20 June		The impact of new technology on rail pricing and ticketing <i>Alec McTavish, ATOC</i>

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THE TRANSPORT ECONOMIST

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Editor
Peter Gordon

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Victorian Railways and the British Economy

Tim Leunig
Department of History
London School of Economics

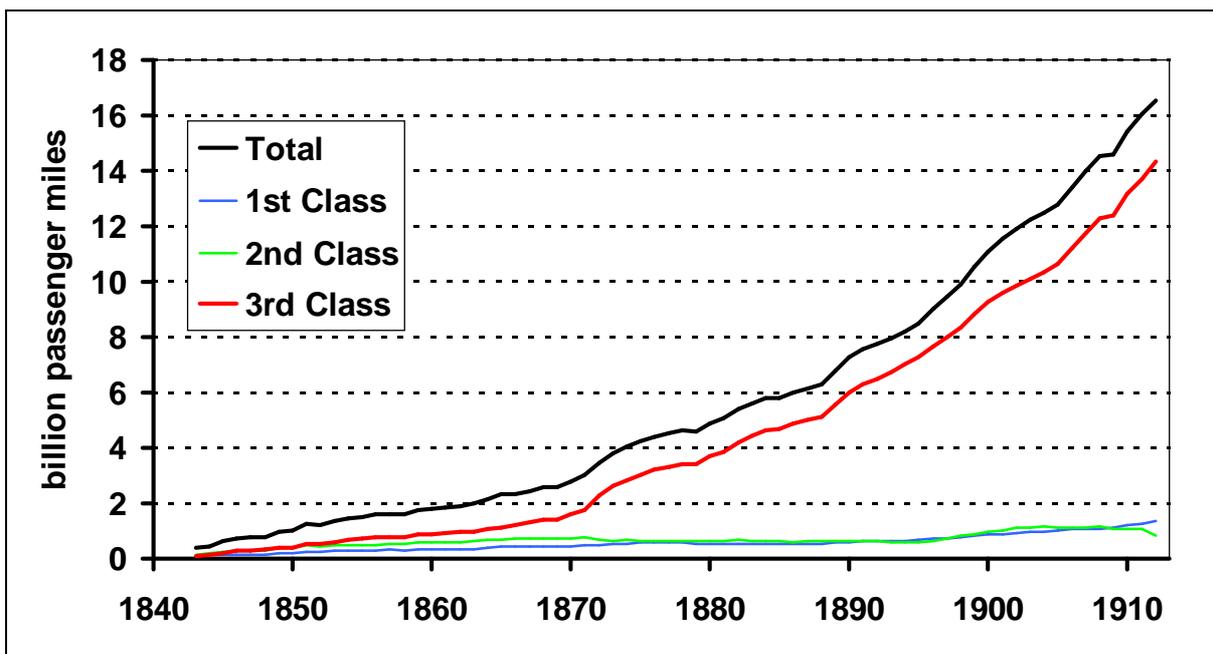
Arup Head Office, Fitzroy Street
24 May 2006

Background

Tim opened with “only study things that will change the standard textbook” and had clearly extended this philosophy to his study of the economic impact of the railways.

Britain was the world’s most advanced economy when the railways first appeared, but was still poor, with average income equivalent to £2,000 at today’s prices. Canals had already revolutionised Britain’s inland freight transport, but passenger transport was either on foot or, for the rich, by stage coach. Total travel by stage coach amounted to only 17 miles per head per annum.

The introduction of the railways allowed rapid growth in travel by the poor, although it was around 1870 before there was a lift-off in their use.



Tim's first analysis concentrated on the social savings – in an arbitrary year of 1865 – relative to the presumed earlier means of making the same journeys. This required estimating both price and time elements of the generalised cost of travel by rail and the alternative, and also a value of time.

Dionysius Lardner had argued that, for 1847/8, the value of time was 6d per hour, equivalent to a plausible £17.50 today, and passengers saved 5.6 minutes per mile. This gave an annual saving of £400,000, but the assumptions were largely unsupported.

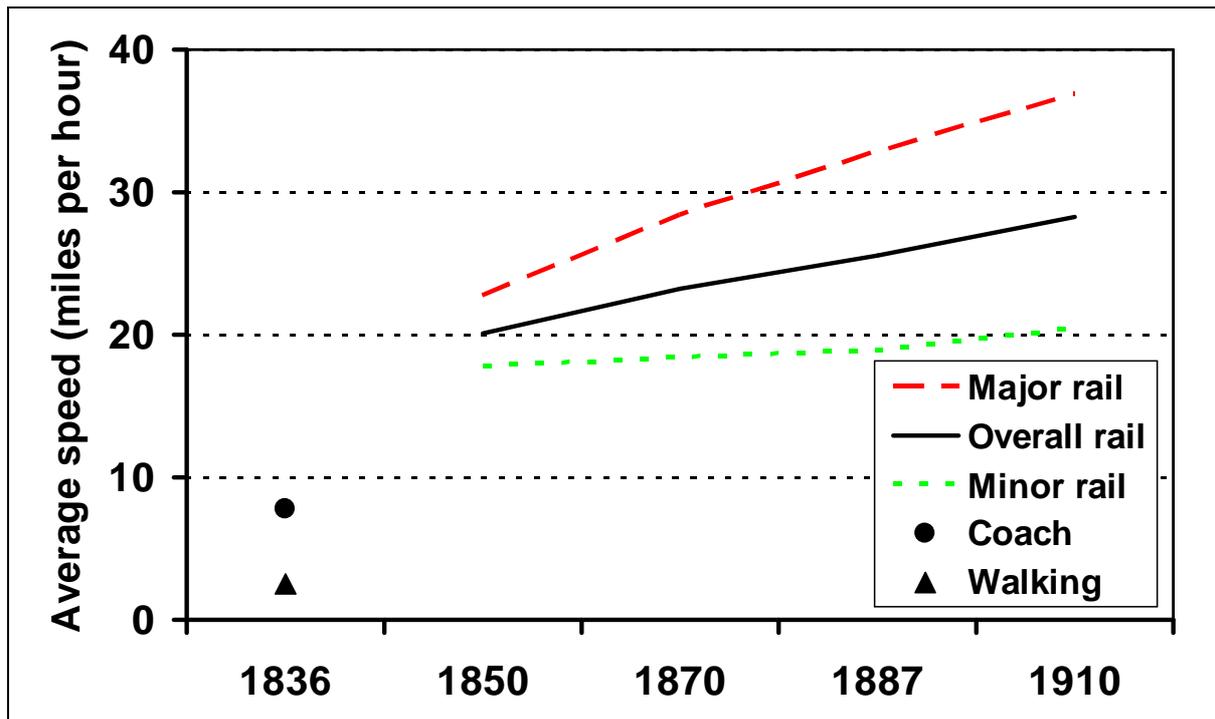
Tim assumed that First, Second and Third Class rail passengers would otherwise have used private coach, stage coach and walking respectively, arguing that at wages of 6d per hour the poor would not pay the calculated 9d cost per hour saved by stage coach.

The Royal Commission of 1867 helpfully stated that the poor had formerly travelled on foot, or by wagon and that the poor achieved the greatest speed gain from the railways.

Determining rail fares was not possible from the tickets, which did not bear a price, but government statistics, the annual Railway Returns, provide comprehensive data on revenues.

It was harder to estimate the average speed of trains and coaches, which in the end was achieved by sample analysis of Bradshaw's Railway Directories and Bates' "Directory of Stage Coach Services 1836". The latter document had sat unread in the LSE library until Tim used it! Tim examined all rail journeys on 50 key routes in 1836, 1850, 1870, 1887 (1890 data was much harder to obtain) and 1910, plus a single journey on 222 minor routes, finding that the overall conclusion was not sensitive to how the results were weighted. He concluded that average rail speeds as the crow flies had been around 20mph in 1850 and risen steadily thereafter on the major lines, partly through more direct routings.

Analysis of Bates suggested an average speed by stage coach of 7.8mph and a realistic walking speed, confirmed by the Ramblers Association, was 2.5mph.



Tim also took into account the generalised cost of waiting time, extrapolating Mark Wardman’s estimates for frequent services to longer intervals, and noting that neither private coach nor walking would have imposed a waiting time.

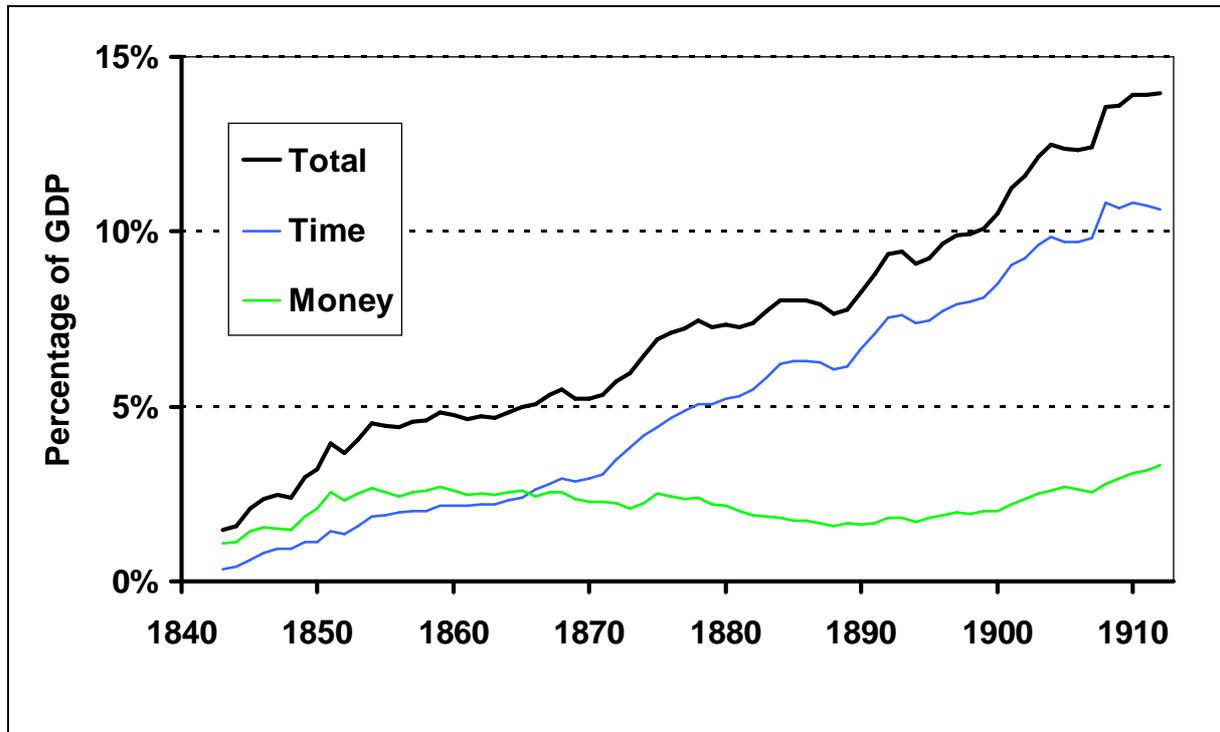
His overall conclusion was that the rail travel in 1865 saved passengers 485 million hours relative to the alternatives, with 391 million hours, or 80% of the saving, accruing to Third Class passengers. With no evidence on the relative proportions of work and leisure travel he assumed a 50:50 mix, valuing this time at £15.5 million or around 2.4% of GDP.

Turning to the money savings, Tim noted that most trips were short and the cost of overnight stay would not be an issue. He estimated that, while Third Class passengers would have spent £4.6 million more than if they had walked, there would be a net monetary saving of £16.7 million or around 2.6% of GDP.

Total savings were therefore around £32.2 million or 5% of GDP.

Tim’s second analysis reviewed the implicit zero-elasticity assumption in the social savings analysis and instead used a consumer surplus approach. There is little evidence of the appropriate elasticity of Victorian travel demand to generalised cost, but a value of 1 seemed “realistic”. This figure resulted in a consumer surplus of around £19 million or 2.9% of GDP.

Tim repeated the analysis for later years and found that 1870 appeared to be the “Ryanair” moment at which demand grew rapidly.



The railway operators realised that the most profitable use of the technology would be to improve and expand the supply of Third Class travel. Time, rather than money, grew to dominate the savings and by 1910 had reached around 10% of GDP.

Tim also examined the impact of the social savings on total factor productivity and concluded that around a sixth of the growth in total factor productivity in the economy of Great Britain resulted from the railways. Evidence that rail influenced industrial location is weak, although Tim thought that the relationship may be stronger in the USA where, before the railways, there was limited river and canal transport to link centres of resource extraction, production and consumption.

Tim is therefore currently examining whether improved railways facilitate commuting and hence raise productivity by increasing effective city size. Past work has tended either to explain the effect, or estimate the effect, but not both. Current estimates are that doubling city size adds 3-8% to city productivity and the work is focusing on this area.

A testable hypothesis is that towns with populous hinterlands should have higher productivity than those without. As a proxy for productivity, Tim used data on bricklayers' wages taken from the 1906 Wages

Enquiry and regressed wages against the population of each town and nearby. There was a clear correlation between population and productivity at radii up to around 20 miles from a town, which is roughly the distance which could reasonably be commuted around 1900. Further work will examine the questions:

- Does the distance that has an effect on productivity increase over time?
- Does the size of the effect at any particular distance increase over time?

Finally, Tim noted that some things will never be captured in an analysis of this sort, such as the ability of all Britons to visit the sea, or the “national-building” aspects dependent on travel, such as national newspapers and national sports.

Questions and Discussion

Peter Gordon (AEAT) asked why Third Class passengers would formerly have walked if their value of time was 6d per hour yet a coach cost only 9d per hour. Tim clarified that Overhead 15 would ideally have stated that “The cost of a coach was 9d / hour **saved**”. **Peter** also asked what difference journey length made to the findings. Tim said that it had been noted that, while a Lancashire weaver could only carry his own wares to market, he could carry those of three weavers to the station. Otherwise, however, there was little evidence of who was travelling and how far.

John Dodgson (NERA) asked why the value of leisure time had been treated as half the traveller’s wages. Tim referred to footnote 70, which notes that DfT currently uses 46% but this includes a larger proportion of non-working pensioners than would have been found in Victorian times: on this basis the 46% was raised to 50%. **John** also noted that the counterfactual assumed that the same journeys would have been made by coach, but that in the absence of rail this would have improved over time. **Martin Higginson** also said that work at the University of York looking at early bus use raised the question of whether conditions so long ago were comparable with now? Tim said that makers of costume dramas find that it is hard to achieve more than around 10mph with a coach – compared with the 7.8mph assumed – even on modern roads, but that to extend the analysis far into the 20th century, when the car, charabanc and bus appeared, would not be appropriate.

Robin Whittaker (*University of East London*) noted that passenger traffic contributed only 10-11% of early railways' revenue, the remainder coming from freight. Tim noted that G R Hawke had covered this well in "Railways and Economic Growth in England and Wales 1840-1870". **Robin** also asked about the workmen displaced by the Great Eastern Railway who were offered cheap commuter fares in compensation. Tim said that the Great Eastern's fares had been atypically low, and probably below cost, and that the existence of this "demand" was artificial.

Tom Cohen (*Steer Davies Gleave*) noted that the elasticity of demand to generalised cost was a critical assumption: how well could it be estimated? Tim flagged a difficulty, that quality and price had invariably changed together with the introduction of rail travel, and extensive research had found no examples of single factor changes. An elasticity of one had been taken as "the conventional value".

Robert Cochrane asked whether there was evidence in Victorian behaviour of a time budget of around 80 minutes for journey to work? Tim said that careful analysis of 19th century court records had been used by others to estimate travel times. **Peter White** (*University of Westminster*) added that travel budgets appeared to be very stable, except perhaps where dominated in poor societies by the need to walk to fetch water: would this not mean that the counterfactual overestimated the actual demand? Tim agreed: hence the need to adopt a consumer surplus approach.

David Spurling asked whether Third Class wagons were covered in the early days. Tim said that they were but had no windows: it was only in the 1870s that the quality of Third Class travel was chosen to attract, rather than deter, customers. David also asked whether bricklayers' wages were subject to an accelerator effect? Tim felt that the effect was small as labour mobility was very high – Lancashire's population grew fourfold while Suffolk's hardly changed – suggesting that wages cleared efficiently.

Report by Dick Dunmore

Tim Leunig's presentation is based on his paper "*Time is Money: A Re-assessment of the Passenger Social Savings from Victorian British Railways*", available at <http://eprints.lse.ac.uk/archive/00000537/>.

The Impact of New Technology on Rail Costs

Phil Smith
Consultant Interfleet Technology

Arup Head Office, Fitzroy Street
27th September 2006

Introduction

Phil introduced himself, explaining his background as an InterCity Investment Analyst, Business Planning Director for Union Railways and then spending 8 years at ORR, including a spell as Director Competition Policy, before joining Interfleet Technology 4 years ago. Stressing that the views expressed were his own, he noted that the rail industry currently had a strange mix of market power.

The proposition

Phil's proposition was that significant potential economic gains from new technology were being foregone by the rail industry because of its complex structure. He felt that this was not the fault of individual parties but of the combination of a complex mix of non-profit and commercial businesses. While the TOCs and FOCs are customer-focused, an essential, publicly-funded industry such as the railway, is almost always producer-focused because the industry in total cannot go bust.

At the macro level, he noted that the scale of subsidy required by the industry had risen from around £1-1.5 billion in 1990, including Eurostar investment, to around £4 billion now, the gap between revenue of £5 billion and costs of £9 billion. Some of the rise was driven by volume, but some by unit costs.

One example was the proliferation of consultancy in the industry. Capable engineers with total annual costs of around £50,000 were being replaced with consultants at up to £500 per day, double the efficient cost.

At the micro level, he compared rail with other industries in which technology has developed, automation has increased, fuel efficiency has improved, and profit margins are generally tight. In contrast, train weights are rising and there have been no step changes in bogie design,

or energy efficiency or in the use solar panels. The greatest change appeared to be in ticketing technology.

New trains

Phil turned his attention to new trains, the cost of which he conceded had remained competitive at around £2 million for a locomotive and £1 million for an EMU/DMU vehicle. The same is also true of metro cars. This is partly because there are always potential new entrants but, he argued, contractual arrangements can generate considerable extra profit, or rather cost.

He illustrated this with a build of around 200 trains under a complex PPP deal, which should generate significant economies of scale. In this case, the price per car was, as expected, consistent with international good practice, but the payment profile required significant up-front payment which, depending on the discount rate used, implied a 6-15% increase in the present value of the costs.

As an example of how technology can lead to improved efficiency, Phil identified an oil condition monitoring system, in essence a sample kit for lubricating, hydraulic and transformer oils. Data is automatically transferred to a lab for analysis, and use of the system reduces failures, and overhaul and corrective maintenance costs, by reducing component wear, increasing train availability and hence revenue earning ability. The TOC benefits, but manufacturers can enhance new build bids and maintenance offer where they are also the maintainer, and the ROSCO benefits from asset whole life advantages. Unfortunately, things rarely worked this well.

A counterexample was the difficulty in gaining the benefits of microchip diagnostics, which could focus maintenance activity and helped reduce whole life costs. These were in common use, but it was proving hard to realise their potential benefit, partly because manufacturers still do not always carry out maintenance and the incentives to reduce whole life costs as part of the design and manufacturing process, could be lost. The unit maintenance costs do not appear to be falling. The reasons for this are complex but the following are a number of “popular” explanations:

- The manufacturer doesn't optimise whole life costs
- The maintainer doesn't have the right skills
- The operator doesn't use the train to do what it was designed for

- The trains are more complex and need more maintenance
- The wheel/rail interface is sub-optimal

The reason seems to depend on where you sit in the supply chain. Phil argued that, whatever the explanation, complexity is part of the problem, because there are so many stakeholders with conflicting interests and no consistent incentives: typically the list of stakeholders would include the manufacturer, ROSCO, maintainer, operator, Network Rail and DfT.

Energy saving

Another example was energy saving. The Parry People Mover using the a flywheel to store energy and can reuse energy on non-electrified lines, but is currently used only on Sundays, on the short branch from Stourbridge Junction to Stourbridge Town. In this case, obtaining the required approvals to operate the service took nearly a decade. Regenerative braking is an established technology which could, in principle, be widely used, but introducing regeneration on main lines now seemed to be too complex to achieve because of all the stakeholders who would have to be satisfied.

A different energy saving technique was the “FreightMiser software”, produced by Australian TMG Technology. By optimising the speed profile against the route topography, and displaying the target speed on an in-cab display, it could facilitate fuel savings, and greenhouse gas reductions, of 10-15%, and save brake wear and tear, even in low-visibility conditions. It typically paid for itself in two years. Phil suggested that the number of stakeholders and scale of approvals required could inhibit the introduction of such a system in the UK.

Track renewals

Phil also described an RATP track renewals machine, used in France to carry out mechanised track renewal on enclosed routes and apparently ideal for the substantial renewal work needed on London Underground’s sub-surface lines under the PPP. It can be set up quickly, enabling track to be re-laid at night without weekend route closures, and can relay up to 100 metres a night. It could halve the number of years required to renew track, and hence ensure that new track was in place when new trains arrived.

LU identified the benefits of the machine through a review of best practice and technologies, but encouraging the introduction of such technology via the PPP arrangements is likely to be difficult with all

stakeholders seeking to pass on the costs and risks to others. Finalising a business case without complete support of the Infraco would be difficult because the base case was poorly understood, and the Infraco is likely to be unsupportive unless a clear business case has been developed. A further problem in such cases would be how to take forward the design quickly when party seemed willing to risk development monies. The situation is made worse when the longer the delay, the more track renewal work that would have been completed by conventional methods and therefore the weaker the business case would be.

Conclusions

Phil concluded that technology will create opportunities but the industry structure will define incentives. Without the right ones, technological gains will not be maximised and at worst may even be lost. He suggested that a “real economist” was needed to work out the marginal cost of the current industry structure.

Peter White (University of Westminster) noted that Tom Winsor had recently defended the contracts-based structure of the railway in *Modern Railways*. He thought that Network Rail offered discounts of 13-15% of traction current charges to TOCs using regenerative braking: was this not enough? Phil said that these rates were averaged over the long term and it had taken many years before such discounts were agreed. While it may be a solution to the issue of encouraging the use of regenerative braking, albeit after many lost years, the example will not encourage the speculative development of similarly beneficial technology. Any party investing in the technology would be betting on the speed of the regulatory framework to catch up and then remain consistent long enough for the investors to earn a return.

Stephen Bennett (ex-SRA) blamed the rise in subsidy to around £4 billion on the action of the many “regulators”: £2 billion for GSM-R, £500 million for TPWS, and the threat of yet more for ERTMS, which would achieve little incremental benefit. Phil agreed, but felt that “Hatfield broke the bank”, giving Network Rail an excuse to do a volume of renewal that would not otherwise have been permitted.

Robert Cochrane (TEG Chairman) noted that there was pressure to enhance gauge to W10 or W12 for freight. Carrying 9' 6" containers on W8 gauge was possible with lowliner wagons, which were seen as too dear, but no one had ever had the incentive to produce them in large numbers. Phil agreed that this could be seen as part of the wider

problem. Robert also asked if safety was being over-egged and whether we needed a single “safety supremo”, but Phil was not sure how it would ever be possible to “bang heads together”, as the SRA had tried to do, in the current industry structure.

Dick Dunmore (Steer Davies Gleave) wondered if long asset lives were part of the problem, contrasting the difficulties Phil had described with the rapid introduction of new ticketing technology, including internet sales, which had contributed to the growth in passenger demand. Phil agreed that it is likely to be easier to take advantage of new technology where the asset lives are shorter but suggested that the ticketing advances had probably only being achievable because it could be achieved by a single layer of the industry structure, the TOC.

David Spurling wondered how we would achieve more electrification. Phil noted that in the 1980s the ECML had been electrified because electricity was expected to cost less and diesel more: in fact electricity had cost more and diesel less, and it might now be hard to make a case for replacing HSTs with electrified stock. He did not believe in a centrally-planned approach. *Julie Mills (Independent consultant)* noted that RSSB and DfT are looking at long term security of fuel supplies.

Tony Lucking asked about wage costs: in Beeching’s time infrastructure costs were 26% of revenues, but now infrastructure absorbs all revenues despite the fact that passenger fares had rise 22-fold since Beeching but RPI has only risen 15-fold. Phil could not explain this, but agreed that some unit costs had risen alarmingly.

Jeremy Drew asked what had happened in other countries, and what was the solution? Phil noted that complexity now seemed to be the flavour of the month, with neither the European Commission nor some member states understanding the problems it brought. He thought that much of the widely-heralded increase in rail travel in Great Britain had been due to rising road congestion and steady economic growth rather than any action on the part of the rail industry.

A final questioner asked if the politicians would continue to tolerate rising costs or would eventually do something? Phil repeated that there was no risk of a crisis as the industry could not “go bust”, but noted that Crossrail’s benefit-cost ratio was now 4:1 and wondered whether politicians were conniving in evaluations which justified their decisions regardless of cost, when wanting new toys. Dick Dunmore pointed out that politicians were constrained by the need for avoid Network Rail’s

£21 billion borrowing facility, and the accumulated debts of the ROSCOs, being treated as public debt.

Report by Dick Dunmore

Too Many Cars? – Ownership, Use and Alternatives

John Bates

Independent Consultant and mathematical economist

Arup Head Office, 13 Fitzroy Street

25 October 2006

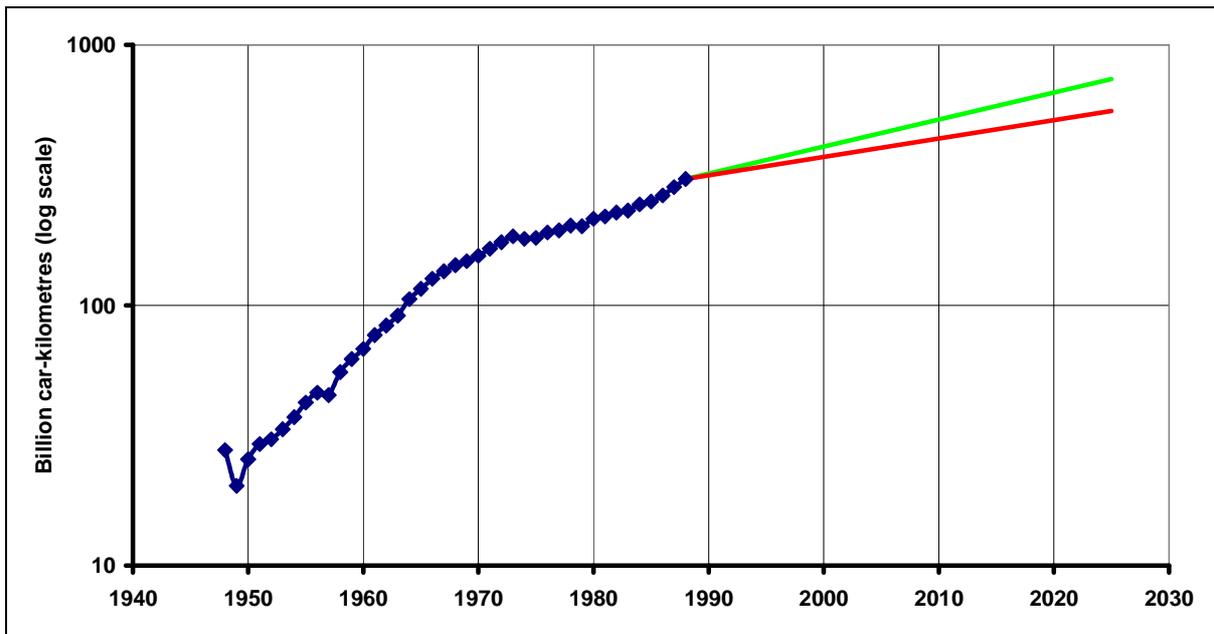
Background

John Bates began his talk with the observation that he hoped more to stimulate thought than to present new deep analysis. As a member of the Steering Committee which had produced the RAC Foundation Report 'Motoring towards 2050' (May 2002), which dealt with long term prospects for car ownership and travel and whose production followed the 2000 fuel protests, he would rely quite heavily on the data in that report. He had had no time to update any of the work quoted. He emphasised also that he would be concentrating on aggregate properties of the data and that this could be in some aspects inappropriate for the analysis of factors such as congestion which were concentrated both spatially and temporarily. He would ignore vehicles other than cars. He had not succeeded in reconciling all the data sources quoted but felt that this did not dilute his main argument to any significant extent.

Reference data

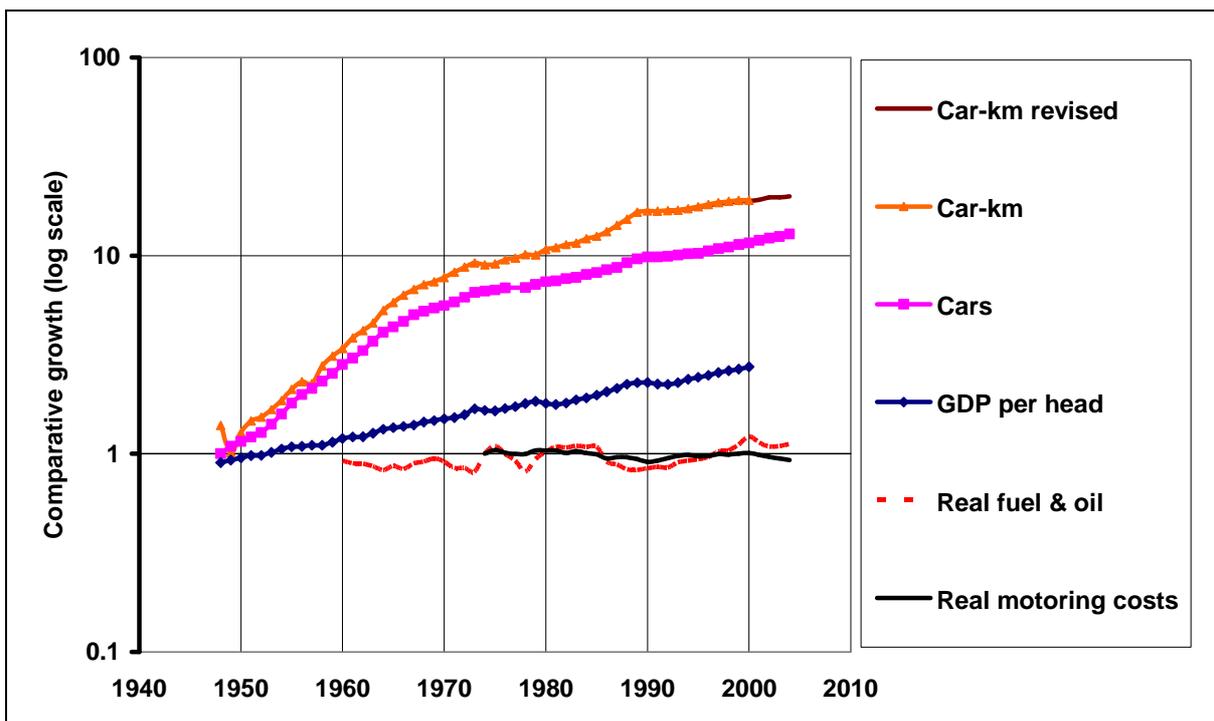
He took as both his starting point and as a reference point to which he frequently returned the National Road Traffic Forecasts (Great Britain) 1989 (NRTF 1989). These then controversial forecasts showed a growth in traffic from 1988 to 2025 of between 83% ("low" forecast) and 142% ("high" forecast) and were much debated at the time. The main argument for declaring these results unreliable was that they were not sensitive to the capacity of the road system. Apart from that they used various disaggregated analyses of demographic data and, as may be seen from the Figure 1, which shows recorded and forecast car-km, they do not look totally unreasonable when viewed on a log scale.

Figure 1: The growth of car travel



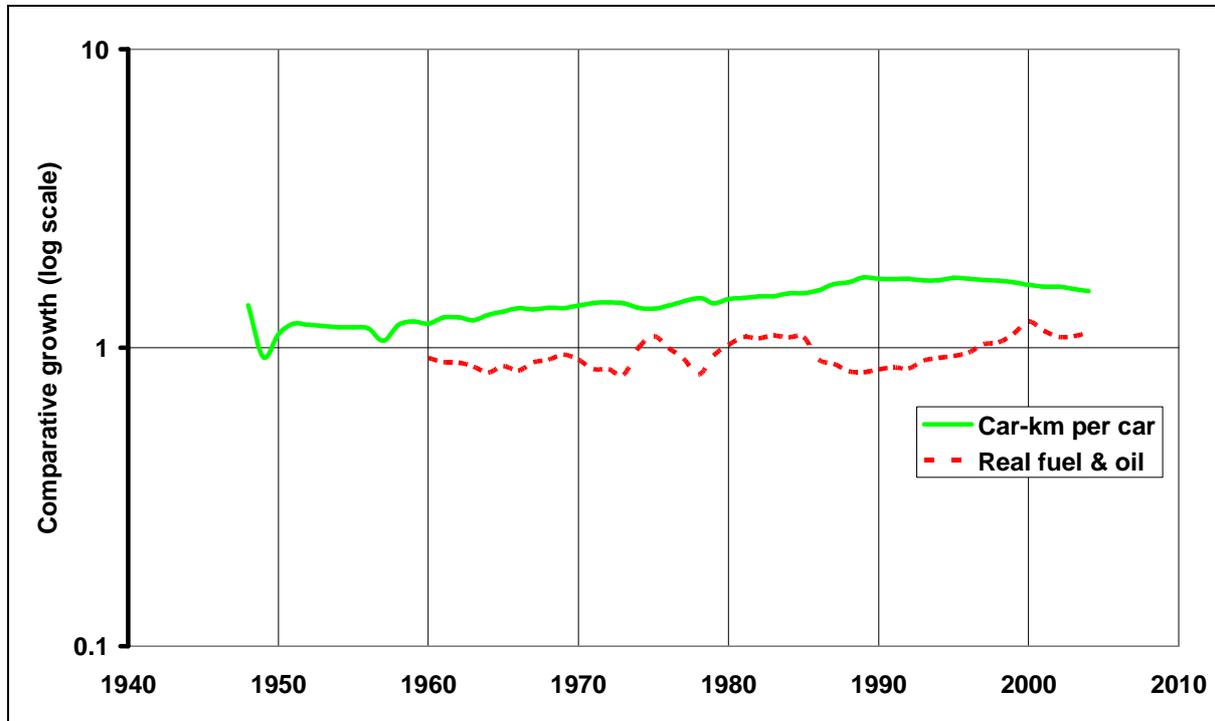
Moreover the values observed from 1988 to 2005 show an initial rise above both forecasts followed, from the mid-1990s, by values very similar to those of the 'low' 1989 prediction. John then displayed a selection of other data sets. He pointed out that growth in GDP per head has for over 50 years been amazingly steady at around 2.1% or 2.2%. There has been little change in the real costs of motoring or of motoring fuel and the graphs for car-km and for cars owned looked very similar.

Figure 2: Growth in motoring costs, GDP, cars and car travel



He illustrated this last point by showing the Figure 3, obtained by dividing car-km by cars. Glaister & Graham (2000) saw a slight decline in this series due to the imposition of the Fuel Duty Escalator (1992-1999) but there is no obvious later upward trend.

Figure 3: Car-km per car



The changes in car-km are summarised below.

1977-1989	+1.5% p.a.
1989-1993	-0.6% p.a.
1993-2000	-0.5% p.a.
2000-2004	-0.9% p.a.

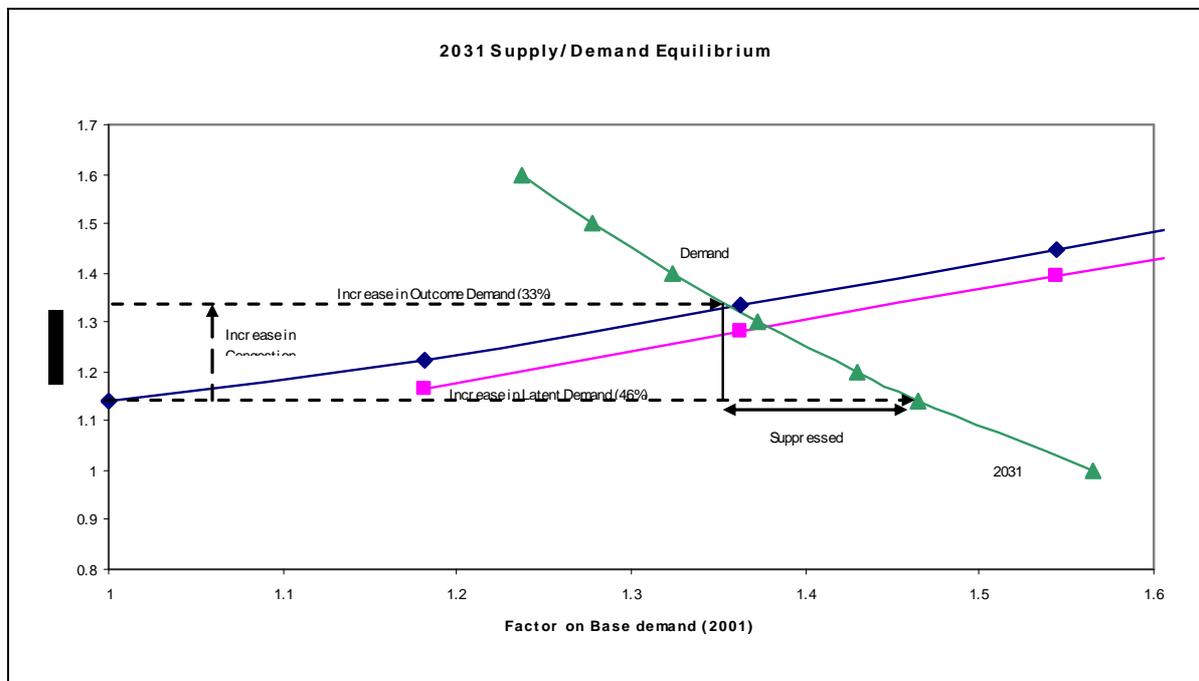
The variation in the trend since 1989 has been small despite aggressive fuel policies. This is the observation which prompted John to ask why it has become traditional to concentrate on car use, which is a fairly constant quantity.

As mentioned earlier, NRTF 1989 did not take account of any depression of demand due to congestion effects. However the RAC study did. It forecast a latent (i.e. unconstrained) demand for car-km of 46% from 2001 to 2031 with congestion reducing this to 33% and increasing minutes/km by 16%. Adding these two new series to the updated NRTF 1989 plots shows the new latent forecast slightly below

the original 'low' line with the congestion-constrained one slightly lower again.

Figure 4 shows the 2031 supply/demand equilibrium considered in the RAC report, with the unmodified supply meeting the demand curve after an increase of 33%. If it is assumed that there is no change in generalised cost then the increase becomes 46%. The lower supply curve shown corresponds to the increased road capacity allowed for in the 10-Year Plan. There is a three-way trade-off between worsening journey times, additional capacity (lower supply curves) and higher costs and to ensure no increase in congestion by 2031 requires politically unacceptable increases in either capacity or fuel costs. The “Do-Nothing” option results in an (aggregate) speed reduction of 0.6% per annum.

Figure 4: 2031 supply/demand equilibrium



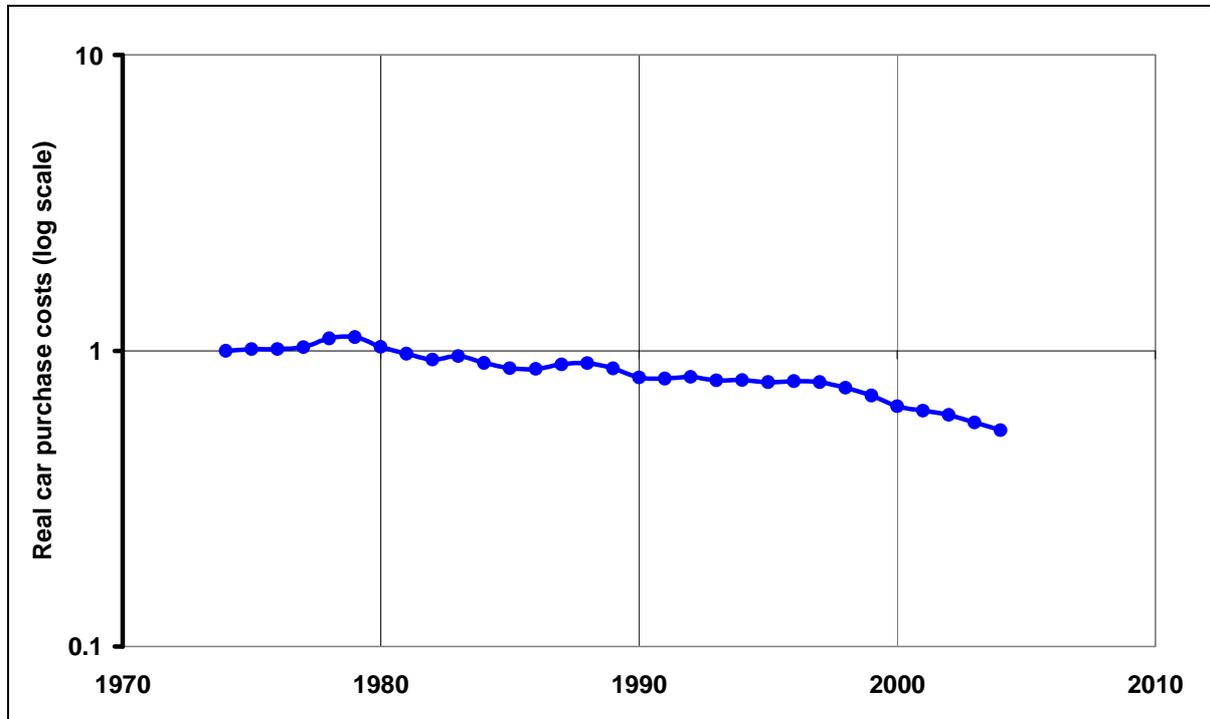
Concluding this initial review of the situation, John said that it seemed that the average cost of car use required to keep congestion at bay was greater than was politically acceptable and that even if the public were to accept road pricing the costs of implementation and operation involved were likely to be high.

A new perspective

John then pointed out that growth in traffic closely matches growth in car ownership, with the forecast increase in car ownership from 2001 to 2031 of 41% lying between the forecasts of latent and constrained

demand in car-km. The price elasticity of cars per household seems to be similar to that for car use, about -0.3 , but car purchase prices have fallen in real terms by about 4.5% per annum since 1996, as shown in Figure 5.

Figure 5: Real car purchase costs



Factors driving the increase in car ownership include the steady rise in population since the mid-1980s, the declining household size, the move from urban centres and increased job insecurity. A counter influence is found in the increasing pressure on car parking in residential areas (on the very morning of this talk the London Borough of Richmond had made the national news with proposals to match the cost of parking permits to car emissions) and John suggested that cars could be limited by fiscal measures to favour “Urban” cars (smaller vehicles less suited to long-distance travel), increased residential parking restrictions and a higher tax on ownership. He pointed out that the National Travel Survey showed that 44% of motorised travel distance is contributed to by 6% of the trips and that the percentage of trips made by car stayed remarkably steady for trips of all length.

In conclusion John said that the days of ‘Predict and Provide’ were over. High speed travel is a luxury and should be paid for, possibly by graded charges for on-street parking, possibly by a speed limit on the interurban network, possibly by straightforward motorway charging. He repeated that road pricing is unlikely in itself to solve congestion and could be very

costly. Most importantly, since the increase in car ownership is the main factor which driving the forecasts of increased travel a well designed fiscal package targeted at Car ownership could make an important contribution to congestion reduction.

DISCUSSION

Questions and comments were then invited from the audience.

Biao Huang (*MVA Consultancy*) pointed out that constraints on car ownership would bear particularly harshly on the disabled and the poor. He also asked whether the marginal costs of car usage should not be met by the traveller.

Response: That was the ideal but is it feasible? As far as the variously disadvantaged were concerned John's view was that too much thought and energy was devoted to specific subsidies rather than to tackling the main problem, which was lack of money.

Tom Cohen (*Steer Davies Gleave*) asked whether a constraint on owning additional vehicles would lead to an intensification of use of the existing fleet. He also suggested that Local Authorities could provide a live case study by charging a substantial premium for residents' permits for second cars.

Response: Yes but the increase would not be as much as that for additional vehicles. And he was not aware of any Local Authorities with such policies.

Andrew Evans (*Imperial College, London*) asked whether the basic assumption was that people bought cars and then decided what to do with them?

Response: This did seem to be the general fashion. The fact that the capital costs of ownership were high and the marginal use costs low did mean that there was always scope for additional use.

Stephen Plowden (*Technical Advisor to the Slower Speed Initiative*) pointed out that the percentage of second and third cars had increased steadily and that this must affect the relationships assumed. He said that John had made little or no mention of alternative modes or of imposed speed reductions. He asked in particular about carbon rationing.

Response: All good points. However, the relationship of travel-making to the structure of household car ownership **was** included in the basic model.

David Starkie asked about the where the imposition of Car Tax fitted into the time scales.

Response: Car tax was abolished from 12/11/1992, Purchase tax was abolished from 31/03/1973. VAT was introduced 10/04/1973.

Robert Barrass (*Independent*) also asked whether the changes in the proportions of second and other cars might not invalidate the conclusions. He also queried whether changes in technology might not suddenly reduce the cost of Road Pricing.

Response: Possible, but look at the many government IT catastrophes in recent years.

David Spurling (*Author*) said that congestion was often caused by parked cars rather than by moving traffic, so should not parking be restricted?

Response: We do indeed need to move forward on a number of fronts simultaneously and think about the whole transport package.

Eileen Hill (*MVA Consultancy*) pointed out that due to factors such as high insurance young people these days acquired cars at a later age than was once common.

Response: Agreed

Paul O'Sullivan (*Department for Transport*) asked whether the main purpose behind the proposal was to curb congestion.

Response: Effectively yes.

Dick Dunmore (*Steer Davies Gleave*) returned to the question of charges for residential parking, pointing out that charges which were only in force during working hours were no deterrent to car ownership. He suggested increases to, say, £2.00 per night. He also thought that the rapid increase in GPS usage meant that the cost of road user charging would soon fall.

Response: Possibly.

Graham Zeitlin (*Independent*) pointed out that the perceived cost of car usage tended to be only the cost of fuel and that British people believed that they had the right to drive. He felt that much stricter health and safety checks should be used to reduce the number of drivers and that violations of the law (e.g. at traffic lights) should be treated much more strictly.

Response: Possibly. It was important to remember that much of the approach to legislation and enforcement was a product of history: an example of this was motor cycle passengers – if the motorcycle was invented at this moment, it is inconceivable that passengers would be allowed on safety grounds, but we are where we are.

Gregory Marchant (*Retired*) also commented on the relatively easy availability of Driving Licences and said that more safety measures to support drivers were needed.

Response: Agreed

This concluded the session. The Chairman, thanking John, commented on the way in which the Peter Hall cycle of expansion and attempted suppression still continued. He pointed out that Colin Buchanan had long ago simplified the issue by making it clear that towns had the choice of either adapting to cars or of banning them. The evening, while making it abundantly clear that there was no single solution to the problem of congestion, had demonstrated the value of a new approach to the question. The audience showed their appreciation.

Report by Jill Beardwood

Norwich Union “Pay As You Drive”™ Insurance

Douglas Vallgren
Norwich Union

Arup Head Office, Fitzroy Street
22nd November 2006

Note: This talk was given in confidence and some detailed commercially sensitive information has been omitted from the report. Members who desire more information should contact the speaker directly at vallgrd@norwich-union.co.uk.

A NEW PRODUCT

Mr. Vallgren, describing himself as a “motor insurance man through and through”, began by explaining that “Pay As You Drive”™ represented a totally new approach to motor insurance. By placing a GPS device in customers’ vehicles it is possible to calculate insurance on the basis of when, where and how often the vehicle is used. The device enables Norwich Union to gather information every second from the vehicle. At the end of each month customers are presented with an itemised bill showing details of every journey undertaken.

The “Pay As You Drive”™ product thus offers the opportunity for fairer prices to customers, giving them more control over their expenditure through choosing to use their vehicles at different times or to use public transport for selected journeys. The use of standard GPS kit means Norwich Union can offer additional services such as better emergency help in case of accident or breakdown or being able to track stolen vehicles. Customers can also sign up directly with the GPS system provider for the regular location and traffic information services.

ECONOMIC CYCLES

The motor insurance market tends to suffer from very short, fairly deep cycles of profitability. Over the long term claims typically account for around 80% of income from premiums, with the other 20% covering operating costs. In the late 1980s competitive pressures on premiums

led insurers to try to improve profitability by seeking cheaper distribution costs, such as direct marketing. During the late 1990s rising injury claims again led to searches for efficiency gains, this time through mergers and acquisitions and web-based marketing. Thus a pattern was established of concentrating on reducing operating costs rather than improving the core profitability of the underwriting.

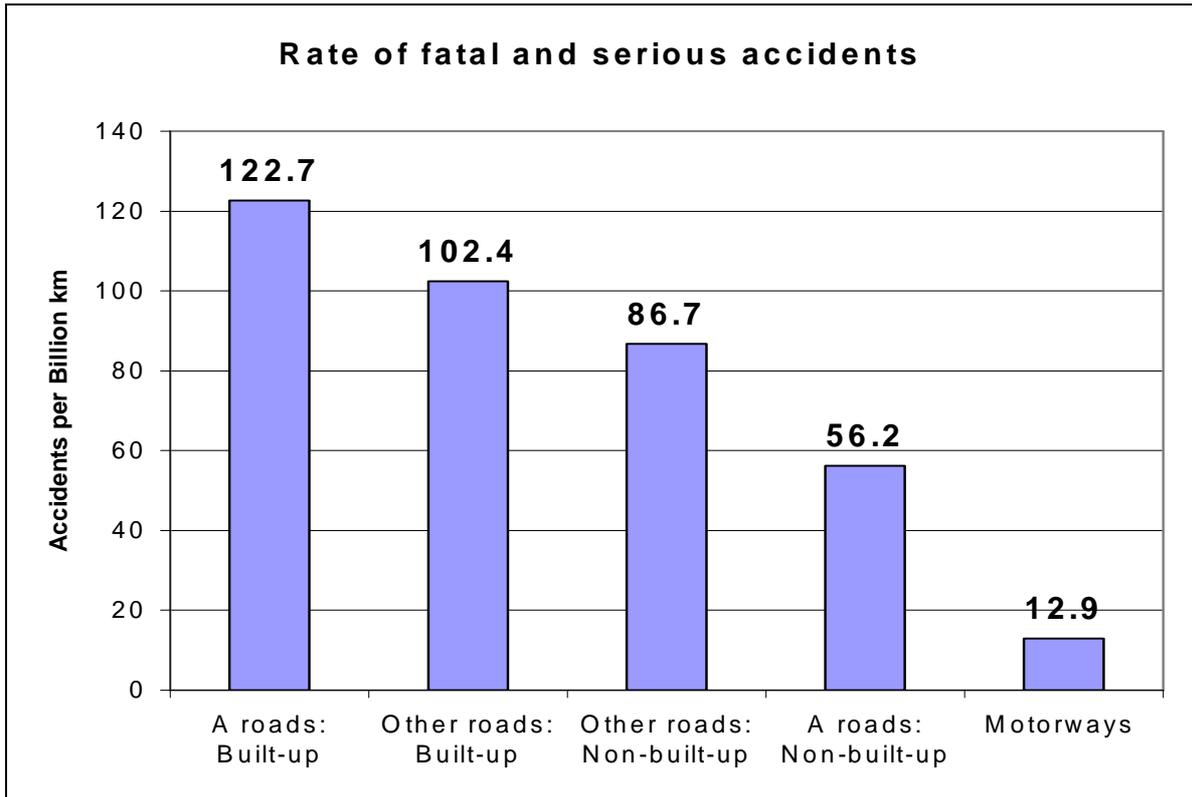
By using some hypothetical figures, Mr. Vallgren explained how in the extremely competitive motor insurance market an attempt to improve margins through increasing premiums could simply lead to a more claim-prone mix of customers for any one particular company. A practical example of what economists term 'moral hazard'.

The decision to go ahead with 'Pay As You Drive' TM represented a bold step to retain a broadly profitable mix of customers through more accurate and more visible pricing. The product gives customers better control of their costs and clearer price comparisons.

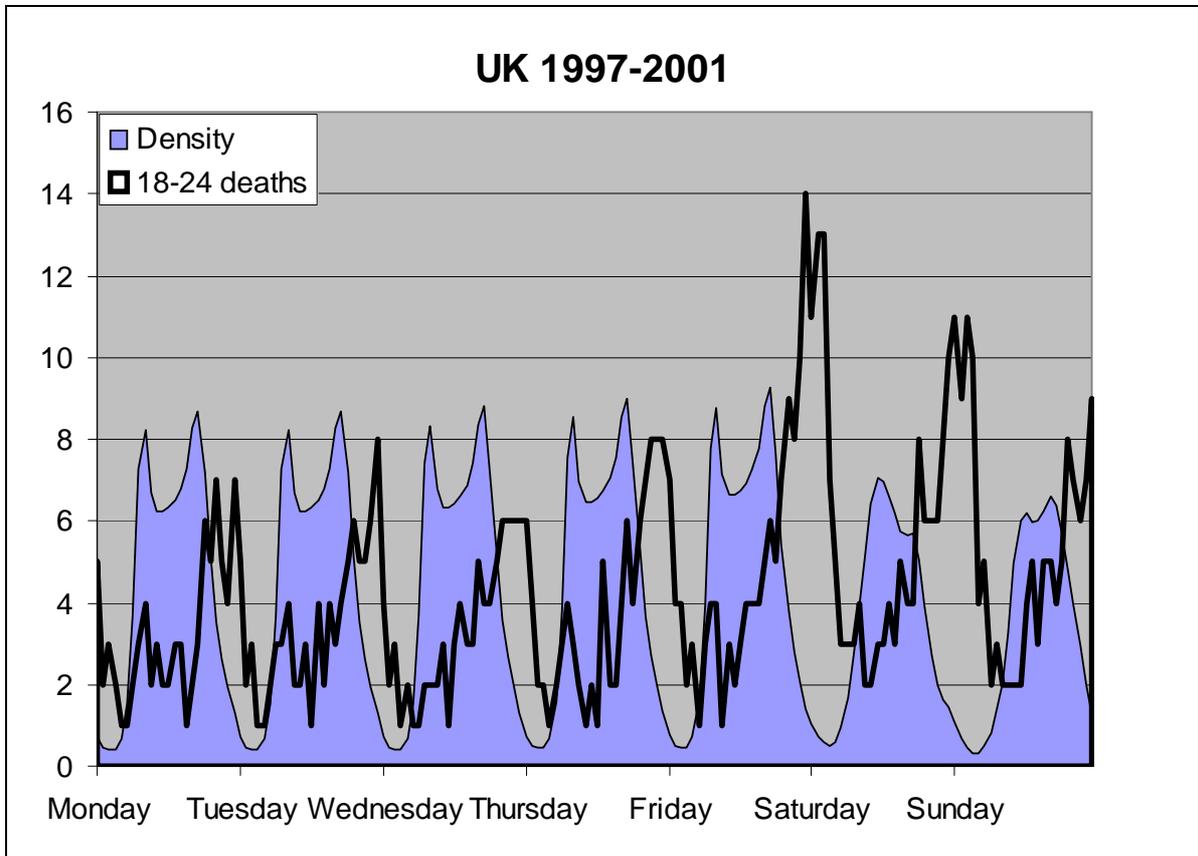
PRICING EVIDENCE

The project began with Norwich Union getting agreement to put GPS boxes in 5,000 of their existing customers' vehicles in order to gather sufficient data to set prices. On the basis of this data they searched for correlations between numerous time, route and other driving variables and the potential for insurance claims.

One factor which correlated strongly was the type of road driven along, as illustrated by Government statistics for fatal and serious accidents shown below.



Another correlating factor was time and day of week for younger drivers, again illustrated by the following Government statistics.



Through their data analysis Norwich Union was able to establish comparative accident risks for different groups of drivers motoring on different types of road at different times of day or days of the week. For example, tariffs are lower for driving outside of rush hours and for driving on motorways.

MARKETS

“Pay As You Drive”™ insurance is designed as a volume product aimed at those who drive outside rush hours or less than 8,000 miles per annum, second car owners and drivers who are prepared to change their car usage in order to save money. At present only just over half of all cars are used for commuting journeys.

Mr. Vallgren referred to the increasing problems caused by uninsured younger drivers; the costs of which add a notable amount to other drivers' premiums. The Pay as You Drive™ product provides affordable insurance for younger drivers, especially for those who do not drive during night hours. By relating price to risk, it encourages this group of drivers to be more aware of the risks involved and engages their parents in debates about car usage. For this group the per mile insurance tariff for driving between 11pm and 6am is set at over 30 times that for driving during the daytime.

For commercial reasons Norwich Union still applied other regular aspects of motor insurance to this product such as restricting vehicle usage to named drivers and for social, domestic and pleasure purposes. Also, different basic per mile tariffs are applied to different classes of drivers.

Fleet insurance represents an even more competitive market than that for private cars. To meet this challenge, Norwich Union is now marketing an alternative product using the same technology to fleet operators on the basis that it helps them satisfy their 'duty of care' responsibilities. Regular journey reports for each vehicle are provided to the fleet operators enabling them to identify and take action on risky behaviour. Specific infringements of traffic regulations can be identified, but are only reported to the vehicle operator.

Mr. Vallgren's discussed further aspects of the contractual arrangements with fleet operators, which for commercial reasons are omitted from this report.

PRIVATE/PUBLIC SECTOR COLLABORATION

Norwich Union recognise the potential importance for road safety and other transport planning of the data collected through the Pay As You Drive™ system. However, they also recognise the importance of maintaining customer confidentiality and hence information is aggregated and anonymised before being passed to other agencies.

Examples of data shared with public agencies include:-

- driver acceleration and braking behaviour near known accident black spots;
- driver response to vehicle activated speed signs; and
- how drivers turn onto slip roads when leaving motorways.

Discussions were ongoing with the Department for Transport, who have shown considerable interest in this aggregate data. Mr. Vallgren expected there to be additional interest at a local highways level.

QUESTIONS & DISCUSSION

Tom Cohen (Steer Davies Gleave) wanted to know what pattern of driver would be 'revenue neutral' to Norwich Union, and whether the profile of Pay As You Drive™ customers was different from the average.

Mr. Vallgren responded that there was no such thing as an 'average driver'. The product had been developed to suit particular drivers and would not, for example, benefit elderly drivers doing a very limited mileage, who already paid a fairly low premium.

Stephen Bennett (Retired) suggested that the data analysis pointed to there being a business case for the insurance industry investing more directly in road safety.

Response: Margins in the motor insurance industry were too low for them to get involved in capital investment. However, they did have an interest in improving safety through driver behaviour which the Pay As You Drive™ product was intended to do.

James Hewson (DfT) felt that the product inevitably attracted relatively low risk drivers who were prepared to lower their risk even further. What, therefore, were the implications for how the remainder of the market was priced.

Response: The take-up of the product at present had not been large enough to influence the overall motor insurance market, although this was possible in the longer term. Pay As You Drive™ is a new product and time alone would tell how it developed.

David Spurling (former actuary) asked whether as part of their marketing to fleet operators, Norwich Union would help firms develop a green transport plan?

Response: Norwich Union were not proposing to suggest to operators that they should reduce their vehicle fleets. Rather the intention was to influence customer behaviour, particularly about the management of drivers.

John Bates (Independent Transport Economist) had had extensive experience in handling problems associated with the collection and analysis of transport data. What problems had Norwich Union experienced and had they ever been challenged over a monthly Pay As You Drive™ bill?

Response: The GPS system does occasionally give rogue data points, but since data is gathered every second and journeys are assumed to be sequential it is possible to smooth out such irregularities. Gathering data every second may appear excessive but, when the product was being developed, they did not know how much data would be required and it is always easier to aggregate than disaggregate.

To date only a couple of customers had challenged bills. In both cases they had been sent detailed information on the journeys recorded and no more had been heard from them.

David Starkie (Economics-Plus Ltd.) wondered whether the scheme might allow Norwich Union to argue for a privatised approach to road pricing. Vehicles which were part of the scheme might be excused vehicle and fuel duty, with Norwich Union collecting a road usage charge as part of their tariff.

Response: Whilst road pricing might rely on similar technology, it was not a subject Norwich Union wished to be too closely associated with. Customers had strong opinions about road pricing which they, as a company, had to respect. The company had an interest in the debate about how road prices might be set since, for example, they would not

wish to see a pricing system which ran counter to actuarial risks by encouraging young drivers to use roads after midnight or elderly drivers onto busy motorways.

Peter White (University of Westminster) asked whether Norwich Union had identified any pattern of displacement activity by younger drivers in the scheme.

Response: It is too early yet to undertake such an analysis.

Peter Gordon (AEA Technology Rail) queried whether drivers in the scheme were still offered a No Claims Discount.

Response: The No Claims Discount, along with other normal motor insurance parameters, was embedded in the core per mile tariff. The product represents a major change for the motor insurance market - probably the first fundamental change since compulsory insurance was introduced in the 1930s.

CONCLUSION

Robert Cochrane thanked Mr. Vallgren for a truly excellent presentation, and for being so frank and open in explaining many of the commercial aspects of motor insurance. The technical, social and economic aspects of 'Pay As You Drive'TM were also interesting in the wider context of transport policy and planning.

Report by Gregory Marchant

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TRANSPORT ECONOMISTS' GROUP

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 peter.gordon@aeat.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.uk.

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