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Reducing Carbon Emissions Through Transport Taxation

Briefing Paper Six
March 2010

About the Green Fiscal Commission

The Green Fiscal Commission is an independent body and is not affiliated to any political party or government. Its membership includes experts from business, leading academics, senior MPs from all three main UK political parties, three members of the House of Lords, and representatives from consumer and environmental organisations.

The Commission's aim is to assess the social, environmental and economic implications of a substantial green tax shift, such that 15-20 per cent of tax revenues come from environmental taxes. The Commission has reviewed and collated the existing evidence on the implications of a green tax shift as well as conducting new research. The results from this work have been placed in the public domain to stimulate debate and, we hope, action on this agenda.

This briefing is one in a series of briefings intended to cover the main issues associated with green fiscal reform. Other briefings have already been published on topics ranging from 'Public Opinion on a Green Tax Shift' to 'How effective are green taxes?'. These are available on the Green Fiscal Commission website: www.greenfiscalcommission.org.uk

'Reducing Carbon Emissions through Transport Taxation' was written by Paul Ekins and Stephen Potter.

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Reducing Carbon Emissions Through Transport Taxation



Summary

Road transport and aviation are, or are becoming, major sources of carbon emissions which will need to be reduced if the UK's carbon dioxide (CO₂) reduction targets are to be met. However, since 1980 the real costs of motoring have fallen while those of other transport modes have risen, and rising incomes have also increased transport demand, offsetting efficiency increases. Increased road transport taxation, which could be introduced as part of a green fiscal reform, will be essential if demand is to be managed and carbon emissions from road transport reduced.

Taxes on vehicle purchase, ownership and use have different effects, and can be used to pursue different policy goals. For example, taxes on purchase and ownership can incentivise manufacturers to develop low carbon vehicles and people to buy them. Tax measures on vehicle use are needed to reduce congestion and overall energy use.

This briefing discusses experience with road transport and aviation taxes in the UK and other European countries, and considers how they might develop to take account of increasingly stringent CO₂ reduction targets and other issues such as the increasing diversity of road fuels, and the need to maintain government income. In particular, any shift to electric vehicles may require a parallel shift to road user charging if revenues from transport taxes, and incentives to reduce the damaging effects of road transport apart from emissions, are to be maintained.

Each tax introduced will affect some people more than others. Increasing fuel duty is progressive overall because most low-income households do not have a car, but there are concerns about the impact on low-income motorists, particularly in rural areas, which can be at least partially addressed if the revenues are recycled in a progressive manner. Increasing taxation on air travel is even more progressive because most leisure flying is by the wealthiest 20 per cent of the population and those on low incomes fly very little.

Transport Costs and Carbon Emissions

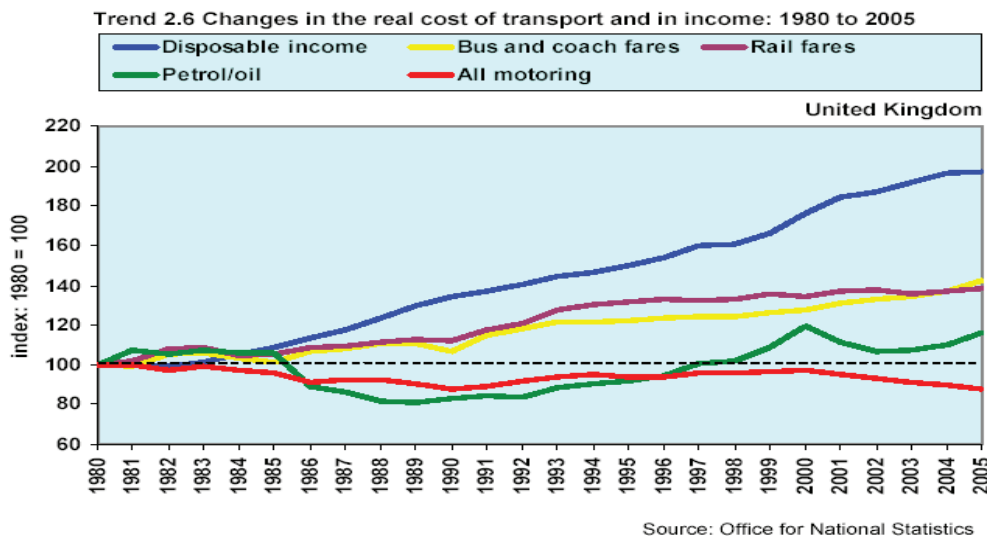
Transport accounted for 28 per cent of UK carbon dioxide emissions from energy use in 2007 (excluding international aviation), and these had risen 9 per cent since 1990, and are still rising. This is partly because, as shown in Figure 1, the price of motoring has fallen; motoring costs in 2005 were 10 per cent less than in 1980, while disposable income had risen by 90 per cent (Department for Transport, 2006a). In real terms over the same period, fares for public transport had risen significantly with a 42 per cent rise for bus and coach and 39 per cent for rail.

The transport sector is therefore a major challenge if carbon emissions overall are to be reduced by 29 per cent by 2020 and by 80 per cent by 2050, as required by the 2008 Climate Change Act.

90 per cent of these transport emissions come from road transport, which is also responsible for substantial costs; economic costs, but also others such as health, congestion, local air pollution and traffic accidents. There are therefore a number of economic and social reasons apart from CO₂ reduction to manage transport demand.

Figure 1: Changes in Wealth and Private Costs of Transport 1980-2005

2.6 Changes in relative costs of transport



Source: Department for Transport (2006a). Figure 2.6

The Department for Transport (2009) report *Low Carbon Transport* specifies a strategy to reduce CO₂ emissions based on three themes:

1. Supporting a shift to new technologies and fuels,
2. Promoting lower carbon transport choices,
3. Using market-based measures to encourage a shift to lower carbon transport.

This incorporates recommendations from the *King Review* (King, 2008) which advocates:

- Cleaner fuels such as electricity, hydrogen and biofuels,
- Consumer choices that stimulate demand for less carbon-intensive vehicles and behaviour change,
- Research and development to speed up the process of innovation in cleaner technologies.



Following these, the NAIGHT (2009) report envisages a significant uptake of electric vehicles by 2014 and large-scale electrification of all light road vehicles (cars and vans) by 2025-30. This would require electric vehicle sales to reach around 750,000 by 2020. By way of comparison, Germany has a target of a million electric vehicle sales by 2020.

All these reports envisage the use of tax concessions and subsidies for electric/cleaner vehicles paid for by re-circulating revenues from other taxation sources.

Road Transport Taxation in Relation to Transport Demand

Transport taxes may be placed at various points of the transport system (Potter, 2008), depending on whether the purpose is to manage vehicle choice or travel behaviour, although both these purposes can contribute to a wider policy objective such as the reduction of carbon emissions from transport.

There are three crucial taxation points which relate to user decisions:

- Tax on the initial *purchase* of a vehicle,
- 'Circulation' tax on the *ownership* of vehicles (such as annual registration tax and company car taxation), and
- Tax on the *use* of vehicles (such as taxes on fuel, tolls, roadspace and parking).

Purchase taxes will have a strong influence on the choice of vehicle and, depending on their design, also on the choice of technology associated with the fuel it uses.

Circulation taxes, although distanced from purchase, also largely have an impact upon vehicle choice rather than use.

Taxes on various aspects of the use of vehicles (fuel, road user charges and parking) have the strongest impact upon decisions to use a vehicle once purchased. The latter are therefore the main taxes related to managing transport demand.

Transport demand depends on a number of factors which together determine the total volume of travel (Potter, 2007). These include total number of trips, trip length, mode of transport used and vehicle occupancy. Policies for reducing congestion, as well as considering the total volume of travel also require a consideration of the location and time of trips.

During the last decade, the UK and many other developed nations have reformed existing forms of road transport taxation to address a number of transport policy goals. This has involved modifying the design of purchase, circulation and fuel taxation to promote:

- More fuel efficient vehicles,
- Alternative fuel vehicles,
- Cleaner fuels (lower carbon and/or other emissions),
- Modal shift and traffic volume
- Congestion reduction.

Overall, when looking at the role of taxation in transport policy it should be recognised that some important tax measures are primarily to influence vehicle technology, the type of fuel used and vehicle fuel economy. If it is desired to manage transport demand, a comprehensive approach is needed covering all its component aspects.

Purchase and 'Circulation' Taxation Measures

Purchase Taxation Measures

Many countries, and most European Union states, have a specific car purchase tax in addition to VAT, although the UK and Germany are notable exceptions. The UK did have a 10 per cent Car Purchase Tax, but in 1992 it was replaced by the UK government policy of raising fuel duty.

In a number of EU countries, existing car purchase taxes have been reformed to promote cleaner and low-carbon vehicle technologies. For example, the Netherlands has introduced a series of reforms to its original 42 per cent car purchase tax that has led, from mid 2006, to registration taxes being reduced for the most fuel-efficient A- or B-rated cars (Skinner et al., 2006). An *ex post* evaluation of the trial that preceded the full introduction of this measure (VROM, 2003) found that, compared to 2001, the market share of the A-labelled cars in 2002 increased from 0.3 to 3.2 per cent, while that of B-labelled cars rose from 9.5 to 16.1 per cent.

This was a much greater increase than had been anticipated (EEA, 2005).

VAT is also a purchase tax, and a variable rate of VAT could be levied. Italy does this. As well as a registration tax, Italians pay two rates of VAT on car purchases; a standard 19 per cent on cars with an engine capacity of less than 2,000cc (2,500cc for diesels), and 38 per cent above this threshold.

'Circulation' Tax Measures

Most developed countries have an annual registration (or 'circulation') tax entitling owners to use the public highway. In many countries this circulation tax is varied by the engine size or power of a car, but some nations have implemented reforms to address fuel efficiency or environmental policy objectives.

The UK has had a CO₂ emission-based circulation tax (Vehicle Excise Duty) for cars since 2001. Initially the range of charges was small, but this has gradually been widened. In May 2009, VED in the UK was restructured into 13 narrower CO₂ bands (see Table 1). The separate 'Alternative Fuel' category will be phased out by 2011 to make the whole system based on CO₂ emissions.

From 2010 there will be a different rate of VED in the first year for brand-new cars. This rate will be much higher for vehicles in Bands H-M and zero for those in Bands A-D

Company car taxation is a sector-specific circulation tax. In the UK, around half of cars are purchased by commercial organisations for their employees for both business and private use. A major reform in UK company car taxation took effect from 2002, when the tax charge was related to a car's CO₂ emissions, on a sliding scale, up to a maximum charge of 35 per cent of a car's purchase price. Moreover, in 2002 discounts for high business mileage were abolished, together with most age-related discounts, which had provided an incentive to drive further and to use older, more polluting cars.



Table 1: Rates of UK Vehicle Excise Duty from May 1st 2009

Car registered on or after 1 March 2001 based on CO ₂		Diesel car Tax Class 49		Petrol car Tax Class 48		Alternative fuel car Tax Class 59	
Bands	CO ₂ emission figure (g/km)	12 months	Six months	12 months	Six months	12 months	Six months
Band A	Up to 100	£0	-	£0	-	£0	-
Band B	101 to 110	£35	-	£35	-	£15	-
Band C	111 to 120	£35	-	£35	-	£15	-
Band D	121 to 130	£120	£66	£120	£66	£100	£55
Band E	131 to 140	£120	£66	£120	£66	£100	£55
Band F	141 to 150	£125	£68.75	£125	£68.75	£105	£57.75
Band G	151 to 165	£150	£82.50	£150	£82.50	£130	£71.50
Band H	166 to 175	£175	£96.25	£175	£96.25	£155	£85.25
Band I	176 to 185	£175	£96.25	£175	£96.25	£155	£85.25
Band J	186 to 200	£215	£118.25	£215	£118.25	£200	£110
Band K*	201 to 225	£215	£118.25	£215	£118.25	£200	£110
Band L	226 to 255	£405	£222.75	£405	£222.75	£390	£214.50
Band M	over 255	£405	£222.75	£405	£222.75	£390	£214.50

*Band K includes cars that have a CO₂ emissions figure over 225g/km but were registered before 23 March 2006

Source: Driver and Vehicle Licensing Agency 2009

An assessment of the impact of this tax change (Inland Revenue, 2004) showed that, in the first year of the new system, average CO₂ emissions of new company cars decreased from 196 g/km in 1999 to 182 g/km in 2002. Because of the abolition of the high mileage tax discount, the number of business miles has decreased by over 300 million miles per year. It is notable that this tax measure affected both vehicle choice and vehicle use.

The size of the tax is important. This is illustrated by UK evidence on the strong impact of the relatively large reform to company car taxation compared with little initial discernable effect of the (much smaller) VED reforms. The 2007-09 changes to VED bands in the UK (particularly the introduction of the higher CO₂ bands, see Table 1) and rises in rates now appears to be having an effect on vehicle choice. In combination with the 2009 scrappage subsidy scheme, fiscal measures in the UK have begun to shift purchase patterns towards lower CO₂ vehicles. The average CO₂ emissions for the cars scrapped under the 2009 scheme is around 179g/km, compared to 134g/km for new cars bought to replace them (Lane, 2009).

As an annual charge on ownership, circulation tax has a less direct impact on the type of vehicle purchased than a purchase tax. It can, however, be a useful complementary measure to car purchase tax, and for countries such as the UK and Germany that have no purchase tax, this indirect alternative may be the only tax available to influence purchase behaviour.

Overall, experience indicates that complementary purchase and circulation tax measures can have a significant policy impact on the type of cars purchased. Potter and Parkhurst (2005) note that the combined effect of well-established highly graded purchase and circulation tax systems in Italy and Denmark help explain why their car fleets have a 20 per cent better fuel economy than the UK. Such tax systems can play an important role in the uptake of cleaner vehicle technologies and low-carbon fuels.



Purchase and Circulation Taxes in Transport Demand Management

As noted above, well-designed purchase and circulation taxes can stimulate cleaner car technologies and fuels. Their position within the tax system means that they have little direct influence on transport demand, but they can affect it indirectly. The economics of low-carbon vehicles are currently such that they have high capital costs and lower running costs. The net impact of strong purchase and circulation tax incentives to reduce relative purchase costs, and parallel fuel tax concessions on cleaner fuels, is to stimulate the take up of fuel-efficient low-carbon cars with very low running costs. However, extending the use of lower-cost, fuel-efficient vehicles will cut the cost of motoring and so will produce pressures to increase car use.

Fuel price elasticity studies (such as Glaister and Graham 2000, and Goodwin 2002) indicate a short term elasticity of -0.4 (i.e. a 10 per cent drop in price would increase car use by 4 per cent), so a 33 per cent effective drop in fuel cost (about the amount resulting from policy objectives for low-carbon cars) might be expected to increase the volume of car travel by about 13 per cent. Cutting transport's environmental impacts will require low-carbon vehicles, but if the tax system only increases the use of these vehicles, then it will raise travel demand, counteracting savings in CO₂ emissions from the low-carbon vehicles. For improvements in fuel efficiency to be translated into reduced overall emissions, tax (and other policy measures) are needed to impact upon both vehicle design and vehicle use.

Managing Transport Demand through Road Fuel Taxation

Taxation measures to influence transport demand need to be positioned to influence not the type of vehicles purchased, but decisions about the amount of travel and mode used. Transport demand management measures include charges on using roadspace such as bridge/tunnel tolls, road tolls and cordon/congestion charging in city centres. Parking charges are a further significant cost that can be influenced by policy, but are not generally viewed as tax. However, in the UK and many other developed nations, the main tax on the use of vehicles is on fuel.

Experience with Road Fuel Duty

Road Fuel Duty is a familiar measure that has long provided a useful and steady income to national and (in some federal countries) regional governments. It is important to distinguish fuel duty from standard sales taxes (such as VAT in the EU). Sales taxes apply to all goods and are levied at a percentage of the price. Fuel duty is in addition to any sales tax, is levied on a per litre basis and the rate may differ according to the type of fuel (diesel, petrol, low-sulphur or LPG).

Fuel duty rates vary considerably between countries, affecting the overall retail price. Table 2 shows this information for the EU-15 states in 2008. It may be seen that while the UK has the highest share of tax in the retail price, it does not have the highest retail price of unleaded petrol.



Table 2: Tax and retail price of premium unleaded petrol, October 2008

	Tax as % of retail price	Retail price (Euros per litre)		Tax as % of retail price	Retail price (Euros per litre)
Netherlands	64	1.63	United Kingdom	67	1.36
Denmark	62	1.58	Finland	64	1.33
Belgium	61	1.55	Austria	56	1.27
Germany	65	1.47	Luxembourg	54	1.27
Portugal	60	1.46	Irish Republic	57	1.23
France	64	1.45	Spain	53	1.23
Italy	61	1.45	Greece	47	1.20
Sweden	63	1.45			

Note: This data covers all tax on petrol (including VAT).

Source of data: www.aaroadwatch.ie/eupetrolprices/ (accessed 16.10.08)

Table 3: Car Driver Distance Travelled per Year and Fuel Duty Paid by Income Quintile, 2005

	Lowest income quintile	Second quintile	Third quintile	Fourth quintile	Highest income quintile	Average
Car driver mileage	1,370	2,324	3,405	4,793	6,574	3,684
Fuel Duty paid*	£93	£158	£232	£326	£447	£250

Source of mileage data: Table 5.5 (p.37) Department for Transport, 2006b.

*Fuel duty paid estimated at 6.8p a mile from the 2005 Fuel Duty rate of 47p per litre and an average UK fuel consumption of 9 litres per 100km.

Fuel duty was not originally intended to be a transport policy measure. It emerged through the 20th century to become a steady source of government revenue that fulfilled a series of important principles of taxation. Firstly, it raises large amounts of predictable and reliable income. Secondly, and unusually for an indirect tax measure, fuel tax has some progressive characteristics, with the top income quintile paying nearly five times more fuel duty than the bottom income quintile, as shown in Table 3.

Finally, fuel tax is administratively simple and cheap to gather, it is easily enforced and evasion is difficult. With most petrol and diesel sold for road transport use, the default position is that it is taxed, with rebates provided for clearly defined other purposes (for example, exemptions may apply for agricultural uses, rail and buses).

In the last 20 years, as well as providing a reliable and equitable source of government income and helping to manage transport demand, fuel duties have been adapted to address a number of transport policy objectives, such as the promotion of fuel efficiency and the use of cleaner and low-carbon fuels. In this respect, fuel taxation is used for exactly the same purpose as purchase and circulation taxes. The key way to do this is to have differential rates of fuel duty to promote fuel switching or use of low-carbon vehicles. For example, a differential duty rate on unleaded petrol was used successfully in several countries in the 1980s and 1990s to promote unleaded petrol and more recently such a rate has helped to speed the transition to low-sulphur road fuels.



In countries like the UK with high duties on petrol and diesel, there is considerable scope to promote new low-carbon fuels and transport technologies by offering substantial fuel duty concessions. In the UK biodiesel and bioethanol have fuel duty rates that are 20 pence below those for the main road fuels (although this is due to end in 2010). However, while this may promote low-carbon fuel and vehicles, it does not affect the volume and modal distribution of travel. Indeed, by reducing the price of some fuels and vehicles, this will serve to increase traffic. Addressing transport demand requires not a differential in fuel duties, but a policy affecting the overall price of fuel.

In the UK, the adoption of fuel tax as a transport demand measure formally took place in 1992 when the Conservative government replaced the UK's ten per cent Car Purchase Tax with the Fuel Duty Escalator, which increased Road Fuel Duty annually at above the rate of inflation, initially by three per cent per annum, then by five per cent per annum and, from 1997, six per cent per annum.

Fuel duty has thus emerged as a policy instrument to promote modal shift. However, by affecting the price of travel, fuel duty also influences other key determinants of the volume of travel, including:

- Trip length,
- Vehicle occupancy,
- Trip linking.

The level of fuel duty will affect all components of transport demand. In addition, high fuel duties will also automatically favour cars with a better fuel economy - so fuel duties will have an impact on the type of vehicle purchased as well as the amount of use.

The effectiveness of the imposition of fuel duty as a general pricing mechanism will depend on the context in which it is applied. In the UK, the general context has been one where, compared to other European countries, both fuel duties (though not necessarily retail prices, as shown in Table 2) and public transport fares are high. The modal shift impact of high fuel duties will therefore be muted, but other price-related impacts on transport demand (on the amount of travel, journey length, trip linking and vehicle occupancy) might be expected to be stronger.

An examination of changes in traffic growth before and after the introduction of the Fuel Duty Escalator policy indicates that this policy did have a general impact. In the six years from 1987 to 1993 (before the Fuel Duty Escalator) UK road traffic grew by 18 per cent, but the rate of growth dropped to 13 per cent in the six years between 1993 and 1999 when the Fuel Duty Escalator was in operation (Department for Transport, 2004b: Table 7.1). Of course, many factors affect traffic growth, particularly the strength of the economy. However detailed fuel demand elasticity studies (e.g. Glaister and Graham, 2000; Goodwin, 2002) suggest that the tax increases resulted in ten per cent less demand for fuel in 2000 than if the duty rates had only increased at the same rate as inflation. The UK Government (cited in Marsden, 2002) estimated that the Fuel Duty Escalator saved between 1 and 2.5 million tonnes of carbon emissions.

The UK Fuel Duty Escalator was abandoned in 1999. From 2000-2007, following the fuel duty protests in 2000, there were only two inflation-related rate rises in UK fuel duty, meaning that the real level of fuel duty fell. In the first two years alone, Road Fuel Tax revenue dropped



by 13 per cent (Department for Transport, 2003) and by 2005 all road tax revenues had dropped by over £2 billion (Potter and Parkhurst, 2005). However, Budget 2009 announced a two pence per litre increase in fuel duty from September 2009, and a one pence per litre increase above the rate of inflation from 2010 to 2013 (HMT 2009, p.133), thereby signalling a low-level, medium-term return to a Fuel Duty Escalator.

The Future of Road Fuel Duty

Over the next decade the road transport taxation landscape is set to change in a dramatic manner. It is possible that road user charges could well become a major part of the taxation system, both in the UK and a number of other countries. There are a number of reasons for road user charges rising up the political agenda among which is the fact that, unlike fuel duty, road user charges can be targeted on the places and times when congestion (which is an important economic cost of traffic) occurs. An additional point is that the increasing diversity of transport fuels, including a possible major future shift to electric vehicles, would obviously raise fundamental questions about the stability of revenues from fuel duties. A shift to road pricing might be necessary if tax revenues from road transport are to be maintained.

Leaving this point aside, there are two key considerations as to whether any new road user charges should replace or be in addition to fuel duties and other taxes. Firstly, there is the point that fuel and vehicle duties serve important transport and environmental policy objectives that are not addressed by road pricing. If fuel and vehicle excise duties were entirely removed then this would sweep away the existing incentives for fuel efficiency and the promotion of low-carbon fuels.

Secondly, studies modelling the impacts of a national road user charge in the UK have suggested that replacing fuel duties with road user charging in a revenue neutral package could actually increase traffic (and emissions) because it would result in motoring costs falling in less congested areas where traffic growth is already rising rapidly (e.g. rural areas and city fringes). It would also lead to activity patterns redistributing to low-charge areas (Wenban-Smith, 2006). The modelling work of Foley and Fergusson (2003) indicates that such a revenue-neutral charge (with the road user charge replacing fuel duty) would help to redistribute traffic and ease pressure on congestion hot spots, but would not necessarily lead to an overall decrease in traffic levels or CO₂ emissions. In the context of eliminating fuel duties, and with the real costs of motoring continuing to fall, a revenue-neutral road user charge would worsen overall traffic levels and CO₂ emissions.

The continuing growth of traffic will greatly multiply the costs of congestion as well as making carbon emission reduction targets more difficult to meet. A green fiscal reform involving a Fuel Duty Escalator-type arrangement with a transparent reduction of other taxes would contribute to the reduction of both congestion and emissions. Such a reform could provide a foundation upon which other, more targeted measures to manage transport demand could be placed - be they fiscal, regulatory, organisational or the provision of infrastructure. A more targeted approach is needed than can be provided by fuel tax alone. Additional measures could include road and bridge tolls, city congestion charging schemes and the treatment of transport by the personal and corporate tax regimes.

Fuel tax has an impact at the national level and its influence is upon the overall pricing context. It exerts a broad positive impact upon the full range of traffic generating factors including not just modal choice, but also the other structural components determining travel volume such as trip length, vehicle occupancy and trip linking. However, fuel tax policies need to be applied consistently and with political sensitivity. Their effects build up slowly and their effectiveness will also depend on the pricing context - particularly the relative costs of public transport and other travel alternatives. If consistently applied over time, high fuel taxes become part of the everyday transport landscape, and so people adjust long-term behaviour and expectations accordingly.

Taxation of Aviation

Air transport is a relatively small, but fast growing source of CO₂ emissions, a point highlighted by the Committee on Climate Change (2009), who have noted that, even if aviation emissions continued at current levels it would require CO₂ emissions from all other

sectors to be cut by 90 per cent to achieve the UK's target of an overall 80 per cent cut. If aviation emissions grow, then the legally binding 2050 target is unattainable.

Aviation currently benefits from a number of tax advantages:

- Aviation fuel is exempt from fuel duty,
- There is no VAT on air tickets. Air Passenger Duty (APD) is generally less than what VAT would be,
- Tax-free shopping at airports is a significant benefit which allows higher rents and subsidises airport charges.

Using taxation measures in aviation is complicated by international treaties that effectively eliminate the possibility of a fuel duty on international flights. Hence a number of proxy or second-best taxation measures have been used of which airport departure tax is the most widespread. In the UK this is Air Passenger Duty (APD), the rates of which for 2009-2010 are shown in Table 4.

Table 4: Air Passenger Duty Rates

Band and approximate distance in miles from the UK	In the lowest class of travel (reduced rate) from:		In other than the lowest class of travel (standard rate) from:	
	1 November 2009	1 November 2010	1 November 2009	1 November 2010
Band A(0-2000)	£11	£12	£22	£24
Band B (2001-4000)	£45	£60	£90	£120
Band C (4001-6000)	£50	£75	£100	£150
Band D (over 6000)	£55	£85	£110	£170

Source: HMT, Pre-Budget Report 2008, p.139

International treaties permit the charging of fuel tax on domestic air flights. Domestic air travel is responsible for 5 per cent of the UK contribution to climate change and is 36 per cent of all UK air traffic movements. Fuel used on domestic air flights is taxed in some other countries, including the USA and Germany. A domestic fuel tax would need to be based on fuel

usage rather than fuel taken on board, to account properly for journeys only partly within the UK, irrespective of where refuelling took place.

Other possibilities for aviation taxation are an emissions charge on airlines, or the levying of VAT on airline tickets. However, given the institutional barriers to taxation at the European



level and to international aviation taxation, the main policy measure that has been adopted at the European level is to incorporate aviation within the EU emissions trading scheme from 2012, with a cap on emissions at the average level for the aviation sector from 2004-2006. Those airlines that exceed this level will have to purchase carbon permits from sectors with a surplus.

Distributional effects of transport taxes

With regard to taxes on motoring, wealthier people are more likely to own a car, tend to drive it further and tend to have a bigger car. The majority of the poorest households do not have access to a car at all. For these reasons the taxation of motoring is progressive, not regressive.

In respect of graduated VED and car purchase tax, the effect on low-income households is small because they are less likely to own cars with high fuel consumption and rarely buy brand-new cars. In respect of fuel duty, distributional concern is focused

on low-income households with cars and in particular those in rural areas, who are felt to have a greater need for a car than people in urban areas. Most low-income losers from increases in fuel duty could be compensated if the revenues were recycled in the form of an income tax reduction, tax credit or benefits increase of the same amount for each household based on the number of adults and children living in it.

With regard to aviation, the majority of air travel by people from the UK (including most travel on low-cost airlines) is by people in the richest 20 per cent of the population. Because people on low incomes fly very little there are no serious distributional concerns about ending aviation's tax privileges. Because with a green fiscal reform additional taxes on aviation would be offset by tax reductions and tax credits elsewhere, a person who flew once a year on a short-haul flight as far afield as Spain or Italy would roughly break even. It would be those who flew more or further than that who would lose, while those who do not fly at all would gain.

Conclusions

For road transport, purchase, circulation and fuel taxation can be used to promote a variety of transport and environmental policy goals. In exploring the use of these tax measures it is important to distinguish between policy measures to influence vehicle characteristics (technology, the type of fuel used and fuel economy) as distinct from vehicle use. Well-designed purchase and circulation taxes can stimulate cleaner car technologies and fuels, but their incidence on car ownership rather than use means that they are not an appropriate means

of reducing traffic. Indeed, if successful, they could increase road traffic if they were to reduce the cost of motoring.

Road fuel duties can be used to reduce traffic, as well as pursue other environmental policy goals related to transport. Rather than replacing fuel duties, evidence is mounting that to manage transport demand and transport emissions any shift to road pricing needs to be in addition to, rather than replacing, fuel and vehicle excise duties.



The UK has no tax measures on vehicle purchase. It has an annual circulation tax that is increasingly graduated by CO₂ emissions, but VED reform on its own has so far been an insufficient policy measure to influence car purchase decisions. Although this may be changing, the major tax impact in the UK, is on fuel; but the use of road fuel duty to manage transport demand has been avoided as a policy mechanism since around 2000.

In fact, overall, the UK Government has increasingly retreated from tax measures on car use, originally distancing itself from London's congestion charge and most recently retreating from its original national road user charging proposals. Regulations and ownership measures to improve fuel economy and encourage cleaner fuels have been maintained but, with the notable exception of the company car tax reform, these have proved ineffective in the absence of strong complementary car use measures.

The transport policy White Paper, published in July 2004 (Department for Transport, 2004a), made official the retreat from car use tax measures. Despite a certain amount of rhetoric, the 2004 White Paper contains little on managing transport demand by any means whatever. It focuses on the competent management of the government's transport investments and cutting costs (of the railways in particular).

This produces a dilemma. The intellectual, research and public policy case for managing transport

demand is well proven. Even if energy and environmental considerations are discounted, trying to tackle congestion without strong demand management measures would be futile. Politically this truth is unpalatable, so the White Paper ends up arguing for demand management measures, but relegates them to politically less sensitive (and less effective) areas. Therefore motorway capacity enlargement has begun, but the complementary measures (tolling or other measures such as high occupancy lanes to 'lock in' the benefits of new capacity) seem to have been abandoned. In response to the recent recession road expansion and other transport infrastructure expenditure has been brought forward, which further exacerbates the situation. Indeed, travel demand management measures that would actually be a better economic stimulus have been ignored.

On the one hand, therefore, there is the retreat from pricing measures on road transport to manage demand; while at the same time there is an acceptance that transport demand management is imperative and that simply tweaking existing tax measures will not be sufficient. It is not yet clear how and when this dilemma will be resolved, but it is also hard to see a solution to excessive traffic that does not involve a green fiscal reform in which a systematic annual increase in fuel duties and other car-based taxes, differentiated according to carbon emissions as appropriate, is compensated by an equivalent reduction in business and personal taxation.

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