

VAT on Domestic Energy

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Preface

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1 Introduction

The decision to impose VAT on domestic energy was one of the most controversial measures included in the March 1993 Budget. Along with food, public transport, water supplies, children's clothes and books and newspapers, domestic energy has until now been zero-rated for VAT - in other words, wholly untaxed. The March 1993 Budget set a timetable for the extension of VAT to domestic energy, to be phased over 2 years. An 8 per cent rate of VAT would be applied to sales of energy to households from 1 April 1994, and this would then be increased to the standard 17.5 per cent VAT rate from 1 April 1995.

This paper considers the impact on households of imposing VAT on domestic energy, and the extent to which the social security system will safeguard poorer households against the additional tax burden.

The plan of the paper is as follows. Section 2 discusses the policy background to the decision to impose VAT on domestic energy, including revenue, efficiency, environmental and distributional issues. Distributional issues are particularly important in the case of the taxation of domestic energy, since, as is well known, energy spending accounts for a much higher proportion of the expenditures of poor households than of better-off households. Section 3 sets out basic data on household spending on domestic energy, and presents evidence on the pattern of spending on domestic fuels across different income and population sub-groups. Section 4 simulates the impact of the tax (at its full level of 17.5 per cent) on a sample of over 7,000 households from the Family Expenditure Survey using the IFS Simulation Programme for Indirect Taxes, which is based on a behavioural model of consumer demand. Section 5 discusses the extent to which the social security system could offset the impact on poor households. Such offsets could arise in two ways, firstly through the automatic route of benefit uprating in line with the retail prices index, and secondly through discretionary measures over and above benefit indexation. Section 6 summarises the argument and draws some brief conclusions.

2 Background to the imposition of VAT on domestic energy

Since the announcement in the Spring 1993 Budget that VAT was to be imposed on domestic fuels, many of the arguments on both sides of the debate have been well rehearsed. This Section outlines the reasons which appear to lie behind the government's decision, and some of the main issues raised.

2.1 Revenue

The main motivation behind the Government's decision to tax domestic fuels was to raise revenue in order to reduce the size of the public sector deficit. By the time of the March 1993 budget, estimates of the PSBR for the fiscal year 1992/93 had reached £ 40 billion, and on unchanged policies the PSBR was then forecast to exceed £ 50 billion in 1993/94 (8.75 per cent of GDP), and to continue at roughly this level in the medium term, even allowing for economic growth of 3 per cent per annum. With lower growth, the deficit would be even larger. Doubts were expressed about the sustainability of the public sector borrowing needed to finance a continuing deficit at the projected levels. (Institute for Fiscal Studies, 1993).

A key theme of the 1993 budget, therefore, was the search for additional sources of tax revenue which could help to close the medium-term gap between government revenues and expenditures. To avoid stifling economic recovery in the short term, the Budget contained two major tax-increasing measures which were intended to increase projected revenues in future years, without affecting the tax burden during 1993/94. The first of these was a 1 per cent rise in the rate of employees' National Insurance Contributions, to take effect from April 1994; the second was the imposition of VAT on domestic energy, to be phased in over two years, at an initial rate of 8 per cent in 1994/95, and then at the full standard rate of VAT of 17.5 per cent from April 1995 onwards. Charging VAT on domestic fuels was predicted in the FSBR to raise £950m in 1994/95, £2.3bn in 1995-96 and around £3bn annually thereafter (HM Treasury, 1993).

2.2 The efficiency case for extending the VAT base

A case can be made for uniformity in the rate of VAT on both economic efficiency and administrative efficiency grounds (Davis and Kay, 1985). Extending the VAT base to include domestic energy, until now zero-rated, may be considered a step towards a completely uniform structure of VAT, based on a single rate, applied to all goods and services. It is possible - but by no means certain - that this partial extension of the VAT base, which extends the number of goods subject to standard rate VAT whilst leaving a significant proportion of consumers' spending subject to a zero VAT rate, could have some of the economic or administrative efficiency benefits that would arise from a completely uniform VAT system.

The **economic efficiency** argument for taxation of all goods and services at a uniform rate has to do with the potential distorting impact of differential taxation on consumer spending choices. If taxes are applied to different goods at different rates (and if

these tax differences feed through into differences in retail prices), consumers will tend to reallocate their consumption expenditure, purchasing less of the most heavily-taxed goods than they would if a uniform tax rate was applied. These distortions in consumer spending induced by taxation constitute an economic cost of taxation, over and above the tax payments themselves. The greatest changes in consumer spending will be found in spending on goods which have relatively close substitutes taxed at a different rate. Unless differences in taxation between goods compensate for existing distortions in the price system (for example the failure to charge for pollution costs, as we discuss later), they will be liable to impose costs on households which increase the costs of raising tax revenues compared to the costs with a uniform rate of tax¹.

As noted above, this argument can only be used to support complete uniformity in indirect tax rates, and does not show that a partial move such as imposing standard rate VAT on domestic energy will be better than leaving domestic energy in the zero-rated category along with food and other "necessities". The distortionary potential of taxes on domestic energy will partly depend on how sensitive domestic energy demand is to price. Domestic fuel is a good for which there are few obvious substitutes; if households are to have heat, light and the use of many durable goods, they have to use energy, and if energy is taxed more heavily there are few alternative goods taxed at a different rate which consumers can substitute for fuel. However, where the tax reform does not lead to a fully-uniform VAT, but merely shifts one good, energy, from the zero-rated to the standard rate category, the relevant distortions are more complex. Whether ending energy zero-rating reduces the distortionary cost of raising revenues through VAT will depend on the amount of substitutability between energy and, on the one hand, other standard rated goods, and on the other, the remaining zero rated goods.

The **administrative efficiency** case for a single rate of VAT is that it is not necessary for either traders or the revenue authorities to distinguish between different goods in operating the VAT system. One aspect of the extra cost of applying multiple rates is that traders and the revenue authorities need to collect and process more information - about the goods to which particular invoices refer, for example. Also, where more than one rate applies, it is almost inevitable that tricky "borderline" issues of definition

¹ The economic issues are in fact more complex than this simple statement. Whether a uniform rate of indirect taxation is optimal depends on whether the government is able to make unrestricted use of lump-sum taxes and transfers on individuals. If it can, uniform indirect taxation will tend to minimise the economic costs of raising tax revenues; if it cannot, non-uniform indirect taxes will be optimal, taxing more heavily, for example, goods which are complementary with leisure (Atkinson and Stiglitz, 1980).

arise, and can lead to time consuming and sometimes bizarre disputes - such as for example the recent legal wrangle over whether fresh orange juice counts as a manufactured beverage (standard rated) or a non-manufactured beverage (zero rated). Both these factors add to the costs of multiple-rate VAT systems compared to a single rate system.

However, in the case of switching energy from the zero-rated group of products to the standard-rate category, it is unlikely that there will be any substantial gains to be made in the administrative efficiency of the VAT system. The system still has to operate two rates, since other goods continue to be zero-rated. In general, most domestic energy suppliers, particularly the gas and electricity companies, supply one product only, and the complexity and cost that arises from handling transactions in goods subject to different rates of VAT applies less here than in cases where, for example, retailers sell both zero-rate and standard-rate commodities. Also, borderline issues are not likely to be important: energy is relatively well defined. The one area where some administrative simplification might be expected is in distinguishing between domestic and non-domestic customers. Since non-domestic energy supplies were made subject to VAT from July 1990 (to comply with EC rules), energy suppliers have had to distinguish between domestic and non-domestic customers, and to bill accordingly. This distinction will no longer be required for VAT purposes once standard rate VAT is levied on sales to both groups, although the administrative cost savings from this are likely to be small.

2.3 Environmental policy arguments

In his Budget Statement, the Chancellor introduced his plans for taxing domestic fuels in the context of global agreements on environmental policy:

"Last June, my Rt Hon friend the prime minister signed the UN Convention on Climate Change at Rio. This was a milestone in international efforts to halt global warming.... In order to meet the commitment we entered into at Rio, action will be required across the whole economy. And in deciding how best to meet our emissions target we will need to ensure that the right incentives are in place throughout the economy - encouraging people to consume less and conserve more."

It is increasingly being recognised that taxation could play an important role in environmental policy, supplementing or replacing policies based on direct "command-and-control" regulation of emissions levels, pollution control technologies,

or product specifications. Compared to regulation, "market instruments" such as taxation have certain advantages. First, they encourage the largest reductions of pollution in areas where the cost of reducing pollution is the lowest, without the need for the detailed information on individual polluters that would be required to achieve the same, least-cost, pattern of pollution abatement with direct regulation. Faced with the incentive provided by the tax, the polluters most able to reduce pollution cheaply will tend to self-select themselves to undertake larger amounts of pollution abatement than those for whom abatement costs are higher. Secondly, environmental taxation and other market instruments provide a continuing incentive to be environmentally-friendly rather than simply encouraging minimum compliance; this can help to encourage innovation in pollution control technologies. Thirdly, taxation raises revenue. In this sense there could be a "double dividend" from environmental tax policies - they may simultaneously improve the environment, and reduce the distortionary costs of raising public revenues, by allowing other, distortionary, taxes to be reduced.

The environmental argument for increasing the price of fuels is based on the idea that the current price is too low because it fails to take account of the social costs of environmental pollution imposed by individual consumption. These costs include the effects of the emissions of carbon dioxide and other "greenhouse gases" from fossil fuel use; accumulation of such greenhouse gases in the atmosphere is likely lead to global warming, and to other, largely unpredictable, local climate changes. Other energy related pollution problems include acid rain, caused by emissions of sulphur dioxide and nitrogen oxides from power stations and other sources, and more local problems of "smog", of particulates emissions (soot), etc.

Imposing VAT on domestic energy would increase the price of fuels to households, and hence might bring the price of energy nearer the level at which it would reflect the full social costs of energy use, taking all of these environmental effects into account. To the extent that energy use has greater environmental costs than other goods and services consumed by households, the logic of the environmental argument is that energy should not simply be taxed at the same VAT rate as other goods, but should be taxed *more* heavily than other goods. Nevertheless, moving from a situation where energy is taxed less heavily than other goods, to a situation of uniform taxation, is, from the environmental point of view, a move in the right direction.

The environmental impact of VAT on domestic energy depends on the responsiveness of demand to changes in the price of energy. If this is low, the environmental benefits of the tax are likely to be limited. It will be noted that the effectiveness of VAT in generating extra tax revenues at low economic cost depends on precisely the opposite characteristics to those which make taxing energy an effective environmental policy instrument. Efficient revenue-raising requires consumer behaviour to change as little as possible in response to the tax; the environmental impact of the tax, on the other hand, will be greater, the more the impact on consumer behaviour.

A further environmental benefit may arise from imposing VAT on domestic energy in that it would correct an existing fiscal *disincentive* which may have discouraged households from investing in energy-efficiency investments such as insulation, double glazing and more fuel efficient heating appliances. The efficient level of such investments will balance the costs of installing energy-efficiency measures against the fuel savings; for the individual householder, this calculation has until now been biased against the investment by the fact that the costs have been inflated by the imposition of VAT, whilst the energy savings have been kept low by energy zero-rating. The Chancellor referred to this in his budget statement:

"For the first time the rate of VAT on domestic fuel and power will be the same as that charged on goods like loft insulation material, which improve efficiency. This will bring an end to the current anomaly which makes a nonsense of any attempt to use the tax system to improve the environment."

One final aspect of the environmental case for imposing VAT on domestic energy should be noted. The government (and the Chancellor's statement quoted above) have sought to present VAT on domestic energy as an alternative to the European Commission's proposed carbon tax, which would be applied to all fuel use, both domestic and non-domestic, at a rate which reflected the carbon and energy content of the fuel². In broad terms, the increase in domestic energy prices through the EC carbon tax (at its eventual level of \$10 per barrel of oil) would on average be much the same as imposing VAT at the standard rate. However, there are important differences. First, the EC carbon tax would tax carbon-intensive fuels more heavily - in other words, whilst the average level of tax would be the same, the EC tax would give an added incentive to substitute to less carbon-intensive fuels. Second, the EC

² See Pearson and Smith (1991) for a discussion of the Commission's proposal, and Smith (1992) for an analysis of its distributional impact.

tax would apply to both domestic and industrial uses of energy; since businesses can reclaim input VAT imposing VAT on business energy provides no incentive to economise on industrial energy use. Third, the EC tax has been intended to form part of coordinated international programme of measures, and, indeed, to encourage international action on global warming. A purely national policy, such as imposing VAT on domestic energy, even if it were to have equivalent effects on energy use within the UK, fails to maximise the opportunity to induce other countries to follow suit.

2.4 European Community rules

VAT is a tax which was introduced on a coordinated basis by all of the member countries of the European Community, to replace earlier taxes which were liable to distort the pattern of competition within the EC. Over time there has been steady movement towards greater uniformity in the precise details of VAT operated in them different member states; in particular, there has been steady progress towards a common tax base, defining the same goods and services subject to VAT in all member states.

One aspect of this has been pressure to limit the extent to which member states use zero-rating for particular categories of goods. Zero-rating has been confined to cases where a social policy justification can be made for its use; otherwise, a positive rate of VAT must be applied. Thus, VAT has already been applied to non-domestic purchases of energy (since 1990), where a social justification for zero-rating cannot be made. However, it is clear that a social policy case can be made for continued VAT zero-rating of domestic energy, and so there is no reason from this source for discontinuing to zero-rate domestic energy.

A second aspect of EC policy which might have had implications for the UK's zero-rating of domestic energy was the abolition of "fiscal frontiers" between member states, as part of the programme of measures to "complete" the internal market of the EC by the end of 1992. In its original statement of the measures required (Commission, 1987), the Commission proposed extensive restrictions on the VAT rates levied by member states; member states would be required to set a standard VAT rate of between 14 and 20 per cent, and a reduced VAT rate of between 4 and 9 per cent would apply to a limited range of "basic goods and services", including domestic energy. This scheme would have required the UK to impose VAT at the reduced rate on domestic energy and most of the other commodities currently zero-rated. There was considerable debate over the necessity of restricting VAT rates in member states as tightly as in these proposals (see, for example, Lee, Pearson

and Smith, 1988). The final agreement reached in 1992 was significantly less restrictive than the original 1987 proposals, and does not require the UK to abandon its existing zero rating. Whilst the agreement continues to stipulate that if member states apply a reduced rate this should be at least 5 per cent, it also permits those member states which already levied rates lower than this minimum, including zero rates, to continue to do so. Thus, there is no requirement from this source either than the UK should abolish zero-rating on domestic energy.

Once VAT is imposed at 17.5 per cent, the UK will levy a substantially higher VAT rate on domestic energy than many other member states. In general, there is no reason for the Community or other member states to be concerned if a member state sets tax rates above the level elsewhere in the Community (except where high tax rates are used to discriminate against imported goods). In a frontier-free Europe, member states may find that market forces limit their ability to levy very high VAT on easily-transportable goods, since they would lose revenues through fiscally-induced cross border shopping. However, as argued by Lee, Pearson and Smith (1988), this is a matter for the member states concerned; in any case, the loss of revenue through cross-border shopping is largely an irrelevant issue for the taxation of domestic energy.

2.5 Distributional effects

The principal objections to the Chancellor's proposals for VAT on energy have concerned the distributional effects of the tax, especially the impact on poorer households, for whom energy forms a large proportion of total spending. Taxing goods which have the character of "necessities", in the sense that their share in total household spending falls as incomes rise, will tend to involve a "regressive" distribution of the additional tax burden: the extra tax will be a higher proportion of incomes for the poor than for the better-off.

Levying VAT on necessities such as domestic energy will tend to increase the regressivity of the tax system, unless compensated by other measures. Should this pose an obstacle to extending the VAT base to cover hitherto zero-rated necessities?

Davis and Kay (1985) argue that zero-rating goods in the indirect tax system is in fact a rather blunt instrument as a means of achieving tax progressivity. The overall progressivity of the indirect tax system is slight, even with zero-rating of many necessities; other taxes, such as income tax, have a more progressive distributional incidence.

Moreover, considering the distributional incidence of only one part of the tax system in isolation is of little interest. Despite traditional concerns over certain elements of the tax system, what matters in the end is the distribution of the total tax burden. While charging VAT on fuels would be highly regressive, it provides revenue, which can be used to facilitate other, more progressive, changes elsewhere in the tax system. For example, since rich households tend to spend more than poor households on necessities, even though necessities take a larger share of the budgets of the poor, simply returning the average extra tax revenue to households as an equal lump sum to all households would more than adequately compensate poorer households for the extra tax on necessities.

Thus distributional concerns should not, by themselves, rule out reform of the indirect tax system. It may be possible to choose to achieve economic efficiency in the indirect tax system by applying VAT uniformly, whilst preserving any desired pattern of equity in the distribution of the overall burden of taxation by making suitable changes to the direct tax system and to social security.

There remain two principal difficulties with this strategy. One is that, in practice, it may prove surprisingly difficult to make even an equal lump-sum compensation to all households for extra VAT. As Johnson, McKay and Smith (1990) discuss, quite a complex package of income tax adjustments and increases in social security benefits and state pensions would be needed (although a reasonable approximation can be achieved). More fundamentally, equal lump-sum compensation to all households may be inadequate if the needs of households for certain commodities differ - if, for example, some groups of households such as the elderly have particularly high needs for certain necessities. Providing sufficient compensation to allow these households to continue purchasing the average level of the taxed commodity may not compensate them sufficiently, if they actually need to purchase more than the average. We return to this issue in Section 5.

One further source of concern about the distributional impact of higher energy prices is the possibility that various market failures in the market for energy efficiency investments may prevent some groups of households from making the most efficient response to the increased cost of energy. These market failures could include poor information about the costs and benefits of insulation and other energy efficiency measures, credit market failures which could prevent some households, especially poorer households, raising the resources needed to make such investments, and tenure-related market failures which prevent the current owner or current occupier of the property reaping the full benefits from any investments they make in improving energy efficiency (Brechling, Helm and Smith, 1991).

Research by Brechling and Smith (1992) using the English House Condition Survey has indicated that tenure-related market failures may be of particular importance as barriers to efficient levels of energy-efficiency investment in the UK; tenants in the private rented sector (many of whom are poor relative to the rest of the population) appear to have much more poorly insulated homes than owner-occupiers and council tenants. Market failures in energy efficiency could exacerbate the costs of higher energy prices to those households affected by the market failure; households which cannot invest in energy efficiency to the optimal level will have to consume higher levels of energy, and hence pay more tax, than households able to invest in better energy efficiency.

This suggests that, in addition to measures giving direct financial compensation to poorer households for additional taxes on energy, policy measures directed at correcting market failures in energy efficiency may also play a useful role in reducing the social and distributional costs of higher energy taxation.

3 Current Patterns of Spending

3.1 Average spending and budget shares

According to the UK Family Expenditure Survey, households in Britain spent on average £12.25 per week (£640 per year) on domestic energy in 1991, some 10 per cent of total household non-durable spending. Of this, £6.21 per week (55 per cent of total energy spending) was accounted for by spending on electricity, £4.89 (40 per cent of total energy spending) by spending on gas, and £1.15 (5 per cent of total energy spending) by spending on coal, oil and other fuels.

Table 3.1. Average spending on domestic energy, average total spending, and average net household incomes by decile groups of net equivalent household income, Great Britain, 1991.³

Decile groups of net equivalent household income	Energy spending (pounds per week)	Energy spending as percentage of total non-durable spending ⁴	Total non-durable spending (pounds per week)	Net household income (pounds per week)
1 (poorest)	£ 10.76	17.4 %	£ 78.56	£ 72.32
2	£ 10.51	15.5 %	£ 90.56	£ 105.43
3	£ 11.22	13.3 %	£ 113.21	£ 150.34
4	£ 11.83	10.5 %	£ 151.83	£ 201.75
5	£ 12.66	8.7 %	£ 186.01	£ 253.53
6	£ 12.68	8.0 %	£ 202.08	£ 297.55
7	£ 12.71	7.0 %	£ 232.88	£ 347.21
8	£ 12.42	6.3 %	£ 261.79	£ 395.92
9	£ 12.88	6.1 %	£ 271.12	£ 454.43
10 (richest)	£ 14.86	5.9 %	£ 344.95	£ 718.25
All households	£ 12.25	9.9 %	£ 193.18	£ 299.63

Source: IFS tabulations from 1991 Family Expenditure Survey data.

³ The equivalised incomes are only used to classify households into decile groups; the average income and expenditure figures shown are unequivalised.

⁴ This column reports the average of the fuel budget shares calculated for each of the individual households in the decile; this is not necessarily the same as the ratio of the average expenditure on fuel of households in the decile to their average total spending.

However, as Table 3.1 shows, domestic energy took a much larger proportion of the spending of the poorest households in the population than of the average household. For the poorest ten per cent of households, domestic energy spending was on average £10.76 per week, which amounted to 17.4 per cent of their total spending on non-durable goods and services. Indeed, it can be seen that although the energy spending of better-off households is higher than that of poorer households, it rises much less than proportionately with either total household income or total household spending. The average energy spending of the richest ten per cent of households was only about 1.4 times that of the poorest ten per cent, whilst their total spending on all goods and services was 4.4 times higher, and their net income was nearly 10 times higher⁵.

There is some tendency for the composition of fuels consumed by poorer households to differ from the fuels purchased by better-off households. In particular, the share of electricity and coal in total fuel spending is considerably higher at the bottom end of the income distribution, and the share of gas substantially higher (Table 3.2). In part, this reflects differences in the possession of central heating. Only some 67 per cent of households in the poorest decile group have central heating, whilst 81 per cent of households on average, and 95 per cent of the top decile, are centrally-heated.

The arguments surrounding the distributional effects of imposing VAT on domestic fuels outlined above centre on the claim that, although poorer households spend less on energy, in terms of pounds per week, than richer households, energy spending constitutes a much larger part of their total weekly budget, and changes in taxes on energy are consequently liable to have more of an impact on their standard of living than for richer households. The remainder of this section looks in more detail at the relationship between spending and income.

⁵ Throughout the analysis households are classified to income groups on the basis of equivalent incomes - that is, on the basis of incomes adjusted for the numbers of members of the household, and their ages. Using equivalent incomes to classify households takes account of the fact a given total income may have different implications for the household's standard of living, depending on the number of individuals which the income has to support. The adjustment factors used are the widely-used McClements equivalence scales (McClements, 1977).

Table 3.2. Household spending on domestic energy: proportions spent on different fuels, and the proportion of households with central heating, by decile groups of net equivalent household income, Great Britain, 1991.

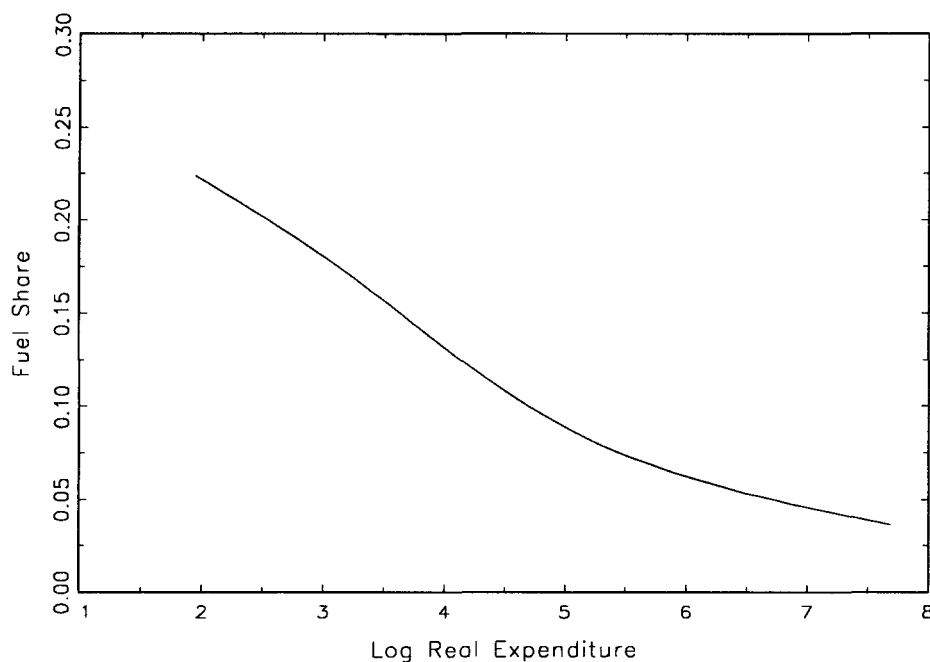
Decile groups of net equivalent household income	Percentage of household total energy spending on:				Percentage of households with central heating
	Electricity	Gas	Coal	Other fuels	
1 (poorest)	60	34	5	2	67
2	58	35	6	2	67
3	57	38	3	1	70
4	56	39	3	2	76
5	56	38	4	2	80
6	55	40	3	2	84
7	53	43	2	2	87
8	54	43	1	2	88
9	53	43	2	3	90
10 (richest)	50	45	1	4	95
All households	55	40	3	2	81

Source: IFS tabulations from 1991 Family Expenditure Survey. Note that row totals may not add to 100 per cent due to rounding.

Whilst better-off households spend more on energy (in terms of pounds per week), they also spend more on other goods; the proportion of total spending accounted for by spending on domestic energy tends to fall as household income, and household total spending, rises. The relationship between total household spending and spending on domestic energy can be represented graphically in the form of an Engel curve, as shown in Figure 3.1. The vertical axis shows the budget share of domestic energy, and the horizontal axis the total level of household spending on non-durable goods and services. In both cases, the spending figures are adjusted for household size - that is, both spending figures are equalised in the same way as in Table 3.1.

Figure 3.1. The relationship between total household spending and the budget share of domestic energy (Engel curve for household spending on domestic energy).

Great Britain, 1991.



Note: Kernel regression estimated using the package NP-REG, on data for households in Great Britain in the 1991 UK Family Expenditure Survey.

Figure 3.1 shows the shape of the Engel curve for domestic energy spending across households in Great Britain in 1991⁶. It can be seen that the relationship is consistently downward-sloping over the whole range of total spending, which can be interpreted as showing that energy spending consistently has the character of a "necessity" at all levels of total spending. The steepness of the slope of the Engel curve declines as income rises, showing that the fuels are more of a necessity for poorer households (those for whom the fuel share is high), than for richer households.

⁶ The Engel curves in this section have been drawn using the non-parametric technique of kernel regression, which illustrates the relationship between the energy share and total spending without imposing any particular restrictions on the shape that the relationship might have. The kernel regression estimates have been generated using the non-parametric regression package NP-REG, written by Alan Duncan and Andrew Jones (see Duncan and Jones, 1992, for details).

It also may indicate that poorer households have less efficient heating systems or worse insulation in their homes than rich households which may contribute to this pattern of expenditure. The data in the FES on heating systems and insulation is limited, which means we cannot address this question directly. Brechling and Smith (1991), however, consider the distribution of energy efficiency measures amongst households using the 1986 English House Condition Survey. They show that better-off households tend to be better insulated - in the sense that they more frequently have loft insulation, draught proofing, double glazing and other energy-efficiency measures. They also suggest that this relationship between income and energy efficiency is not simply a reflection of the lower level of energy spending by poorer households (which could make insulation measures less cost-effective than in richer households wishing to spend more on energy services), but may also in part be traced to various sources of market failure, especially in tenanted properties, which have prevented households making an efficient level of investment in insulation.

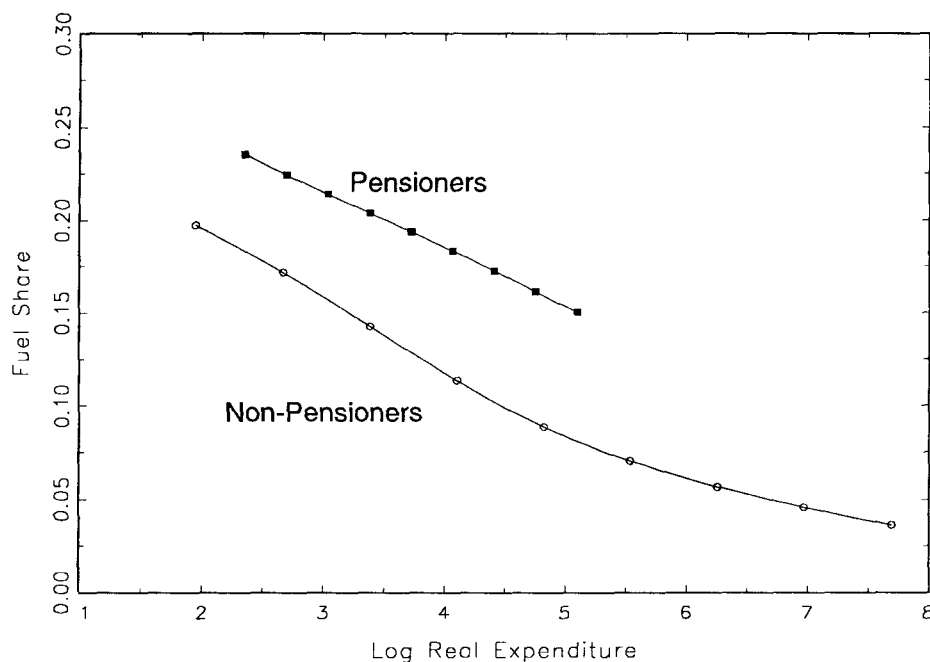
There are various household characteristics which might affect the relationship between total income (or total spending) and the share of spending on domestic energy. One is age: the elderly are likely to have an above-average need for domestic energy for heating, both to the extent that retired people are at home for more of the day than those of working age, and because some of the elderly may have a greater need for warmth. Figure 3.2 shows estimated Engel curves with the sample split to show the difference between pensioner and non-pensioner households.

The higher of the two solid lines is the Engel curve for pensioners; it can be seen that it lies consistently above the Engel curve for non-pensioners with similar levels of total spending. Pensioners are disproportionately represented in the lower half of the income distribution⁷; the Engel curve for pensioners cannot be drawn with any precision for households in the top third of the range of total spending, because there are insufficient pensioner households in this range. However, even among poorer households, pensioners still spend proportionately more than non-pensioners on fuels. This means that, not only will the imposition of VAT on fuels be liable to have a greater impact on the cost of living of the poor than the rich, but it will have an even more pronounced effect on the cost of living for pensioners.

⁷ Strictly, Figure 3.2 shows that they are mainly in the lower end of the expenditure distribution. However, income and expenditure are closely correlated.

Figure 3.2. The relationship between total household spending and the budget share of domestic energy: pensioner and non-pensioner households compared.

Great Britain, 1991.

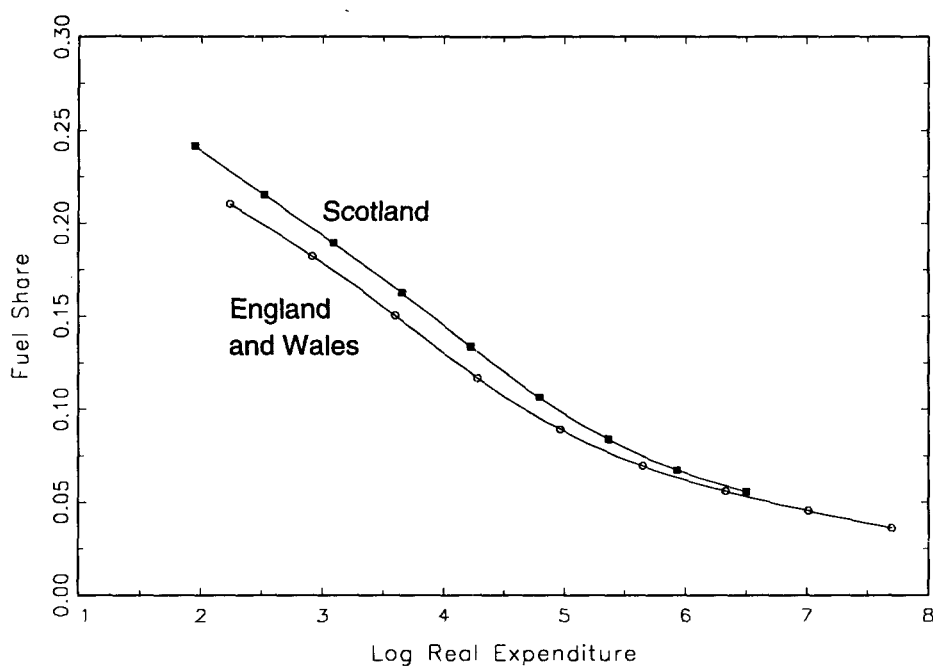


Note: As Figure 3.1.

Other factors which affect household fuel expenditures may be regional. Baker and Crawford (1993) showed that households in Scotland spend a greater proportion of their budgets on fuel than similar households in England and Wales. Figure 3.3 illustrates two Engel curves. The Engel curve for households in Scotland lies mainly above and to the right of the curve for English and Welsh households. For a given level of total spending, Scottish households spend more on fuel than their English and Welsh counterparts.

In part this may be related to generally colder winter temperatures in Scotland. However, other features of the Scottish population also contribute to this pattern. Baker and Crawford (1993) showed that the proportion of households in Scotland with gas connected to their homes is around 20% less than in England and Wales. The proportion of households with all-electric central heating is approximately twice that in England and Wales. To the extent that electricity is a more expensive form of space heating this may account for some of the regional difference in fuel spending.

Figure 3.3. The relationship between total household spending and the budget share of domestic energy: Scotland compared with England & Wales, 1991.



Note: As Figure 3.1.

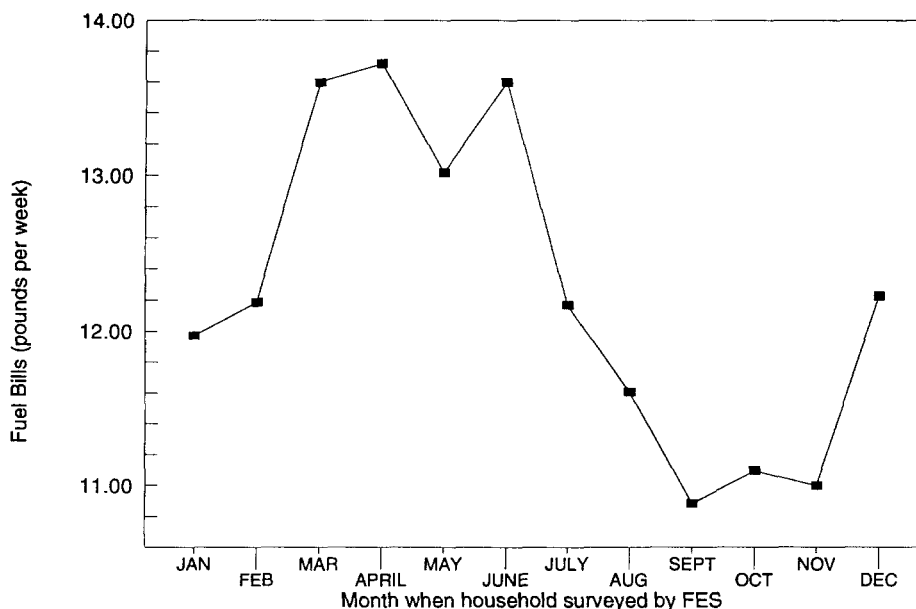
3.2 Seasonality

The Family Expenditure Survey data used in this analysis does not record the fuel expenditures of households over the course of an entire year, although in most cases the length of the period to which energy spending data refer is rather greater than the two week period during which households keep diary records of most other spending.

Spending data in the FES relating to gas and electricity supplies is generally based on the most recent bill received; since households are normally billed quarterly in arrears this will be a bill for a three month period, ending at some time in the past three months. The gas and electricity spending information recorded in the FES thus relates to consumption on average between one and a half and four and a half months previously, and in some cases up to six months previously. If there is a seasonal pattern in consumption of gas and electricity, this will tend to be reflected with a lag of this length in the expenditures recorded in the FES.

Figure 3.4. Seasonal variation in fuel bills recorded in the Family Expenditure Survey.

Pounds per week, Great Britain, 1991.



Source: IFS tabulations from 1991 Family Expenditure Survey data.

Some households pay for gas and/or electricity through a slot-meter system. In the case of these households, the information recorded in the FES relates to their spending on the meter during the two week diary period only. Since, however, such meters frequently over-charge relative to the final bill due, an adjustment is made periodically, in the form of a refund. The FES records a weekly amount based on the refund for the previous year, and this is subtracted from the meter payments recorded over the diary fortnight. It is probable that there will be a clear seasonal pattern to meter payments, whilst the refund amounts will not reflect any seasonal variation in payments.

For spending on energy other than electricity and gas, such as purchases of coal, the data in the FES are based on spending during the diary fortnight. Since such spending is generally in the form of infrequent purchases of stocks of fuel intended to last for a period of time, many households will record no spending of this sort, even if at some time during the year they do make occasional large purchases. On the other hand, those households recording such spending will typically record large amounts, to cover more than just the diary period. On average, the correct amount of spending will be recorded, although there will be much greater variation in the

recorded spending of individual households than there would be if the spending were recorded over the whole year. Any seasonal pattern in purchases of these fuels will be expected to be reflected in the FES data.

Table 3.3. Average and standard deviation of spending on domestic energy, and standard deviation after correction for seasonal variation, by decile groups of net equivalent household income, Great Britain, 1991.

Decile groups of net equivalent household income	Energy spending (pounds per week)	Standard deviation of energy spending (unadjusted)	Standard deviation, adjusted for seasonal variation
1 (poorest)	10.76	6.74	6.67
2	10.51	6.66	6.51
3	11.22	6.43	6.29
4	11.83	7.88	7.51
5	12.66	8.72	8.18
6	12.68	7.41	7.24
7	12.71	7.24	7.04
8	12.42	6.39	6.33
9	12.88	8.16	7.82
10 (richest)	14.86	9.79	9.31
All households	12.25	7.70	7.59

Source: IFS calculations from 1991 Family Expenditure Survey data. Multiplicative seasonal adjustment based on the profile shown in Figure 3.4

The seasonal pattern in FES spending on energy overall is shown in Figure 3.4. As would be expected, some seasonal variation is observed, although this is relatively small; spending ranges from about £11 per week (£143 per quarter) on average for those interviewed in September to November to about £13.50 per week (£176 per quarter) in March, April and June, a range of only about plus or minus 10 per cent around the average for the whole year. The average three month time lag in energy spending billed quarterly in arrears appears to be reflected in this figure; peak spending in March to June would imply peak consumption in December to March. The seasonal pattern in FES spending shown in Figure 3.4 will, of course, understate the true seasonal variation in energy consumption because of the different timing of

different types of energy spending noted above, and the fact that some purchases of storable energy such as coal can be made well in advance of when they are consumed.

Seasonality is one reason why the spending of individual households on energy varies around the averages shown in Table 3.1. There may, however, as we have seen above, be other reasons for individual variation, such as differences in location, individual preferences and living patterns. Some of these other reasons for individual variation (such as the greater need of vulnerable elderly people for warmth) may be of concern for energy policy. How large is the seasonality in the data, relative to other sources of individual differences in spending?

Table 3.3 shows the effect of making a correction for the seasonal pattern in the data on the variability of the spending of households in each income decile. It is clear that most of the reasons for individual variation in spending arise due to factors other than seasonal fluctuations in spending; although seasonal adjustment reduces the standard deviation of spending in each decile, the size of the reduction in the standard deviation is small. Seasonality is therefore not the main reason why the energy spending of households in the FES varies around the decile mean; the reasons for the variation observed would therefore appear mainly to do with other factors, such as needs and preferences, affecting the energy consumption of individual households.

4 Simulation Results

In this section we simulate the effects of imposing VAT at the full 17.5 per cent rate on domestic fuels. The simulations use the IFS Simulation Program for Indirect Taxation (SPIT), which is based on Family Expenditure Survey data and an underlying econometric model of household spending patterns which shows how household spending would be expected to respond to changes in the prices of different categories of household spending. More details of the model can be found in the Appendix.

Table 4.1. Simulation of the effects on energy spending and indirect tax payments of imposing VAT at 17.5 per cent: overall effect, and effect by quintile groups of net equivalent household income⁸.

Great Britain, 1991.

Quintile groups of net equivalent household income	Additional indirect tax payments (pounds per week)	Additional indirect tax payments as percentage of total spending ⁹	Percentage change in energy consumption
1 (poorest)	£ 1.56	2.0 %	-9.2 %
2	£ 1.83	1.3 %	-8.3 %
3	£ 2.11	0.9 %	-6.2 %
4	£ 2.18	0.7 %	-4.2 %
5 (richest)	£ 2.63	0.6 %	-1.1 %
All households	£ 2.06	1.1 %	-5.8 %

Source: IFS estimates based on Simulation Programme for Indirect Taxes.

The estimates compare the household spending and tax payments when domestic energy is zero-rated with household spending and tax payments when VAT at 17.5 per cent is imposed on domestic energy. In the second case, tax payments can differ from the first case for two main reasons: the change in tax rates, and the change in tax base, due to changes in consumer spending. To the extent that the higher price

⁸ The equivalised incomes are only used to classify households into decile groups; the average income and expenditure figures shown are not equivalised.

⁹ This column reports the average of the fuel budget shares calculated for each of the individual households in the decile; this is not necessarily the same as the ratio of the average expenditure on fuel of households in the decile to their average total spending.

of fuel induces consumers to buy less fuel, the second effect will tend to reduce the impact of the first, and the changes in tax payments will be less than they would be if the amount of fuel purchased were to remain constant.

The model results represent the way in which household spending would be expected to respond to higher energy prices in the short run; in other words, before households have made adjustments in the stock of energy-using durables and other investments such as in the level of insulation. Over the longer run, households might be expected to make such adjustments, and the long-run behavioural changes could be rather larger than those reported here.

It will be noted that, to avoid presenting excessive detail, our simulations show the final impact of the tax only, and do not take account of the phasing in process, via an initial year of VAT at 8 per cent. Whilst not absolutely precise, a reasonable indication of the effects of VAT at 8 per cent rather than 17.5 per cent could be inferred from the figures given here for a 17.5 per cent VAT rate, on the basis that the additional tax payments and behavioural responses would be a little less than half those shown here.

Table 4.1 summarises the main results of the simulation for the whole sample of households in Great Britain in the Family Expenditure Survey. Figures 4.1 and 4.2 then highlight two of the key results.

Table 4.1 shows that imposing VAT at 17.5 per cent on domestic energy would be expected to increase households' indirect tax payments by on average £2.06 per week (£107 per year), equivalent to some 1.1 per cent of total household spending. The bulk of this change in indirect tax payments would be the VAT levied on domestic energy, but the estimate does take account of the fact that tax revenues on other goods would be likely also to change, due to changes in the allocation of household spending in response to the change in the price of energy relative to other goods.

The increase in indirect tax payments would be higher amongst better-off households, in terms of pounds per week. For households in the poorest quintile, the average extra indirect tax would be some £1.56 per week (£81 per year); for households in the richest quintile the extra tax would average £2.63 per week (£137 per year). However, this additional tax would constitute a much smaller proportion of spending for better-off households than for poorer households; for the bottom quintile the extra tax would be on average approximately 2.0 per cent of total non-durable spending, whilst for the richest quintile only 0.6 per cent. The additional tax will thus have a regressive distributional incidence across households, in the sense that it falls as a proportion of total spending at higher levels of income.

Figure 4.1. Simulation of imposing VAT at 17.5 per cent: increase in indirect tax payments as a percentage of total spending, by quintile groups of net equivalent household income, Great Britain, 1991.

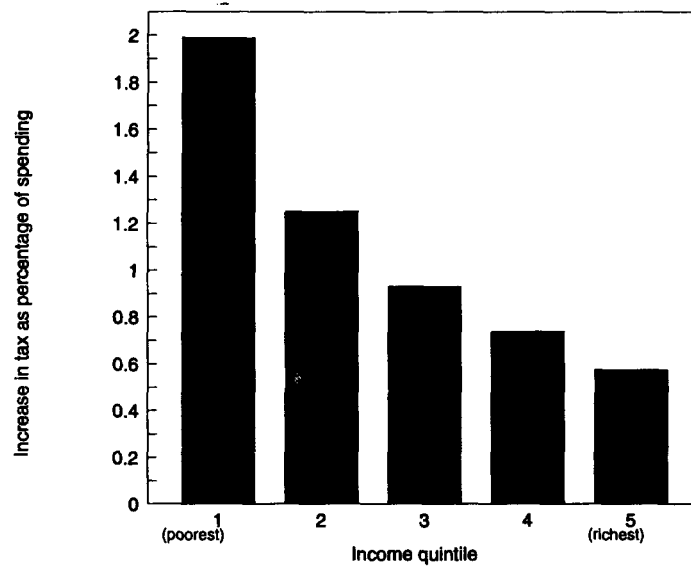
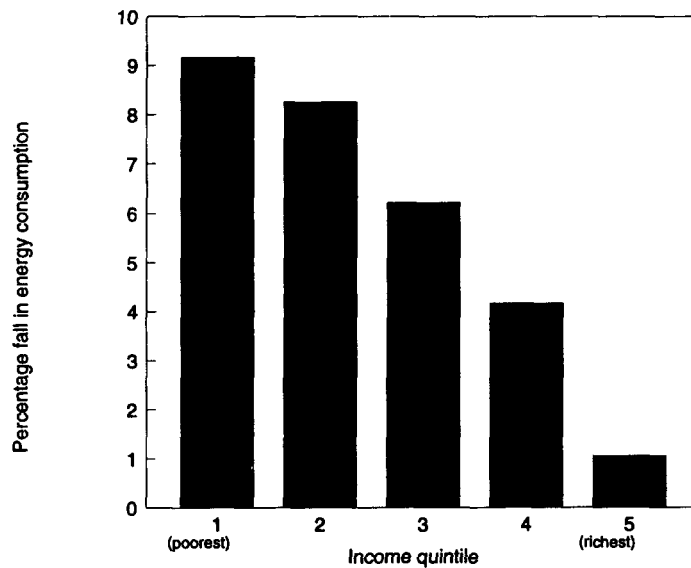


Figure 4.2. Simulation of imposing VAT at 17.5 per cent: percentage reduction in domestic energy consumption in volume terms, by quintile groups of net equivalent household income, Great Britain, 1991.



Source, Figures 4.1 and 4.2: IFS estimates based on Simulation Programme for Indirect Taxes.

The impact of the higher price for domestic energy on consumption of domestic energy would be relatively small; Table 4.1 suggests that households' consumption of domestic energy in volume terms would be likely to fall by, on average nearly 6 per cent. A rather larger percentage reduction in consumption would be expected amongst lower income groups than amongst better-off households; amongst households in the bottom income quintile, consumption would fall by some 9 per cent on average, whilst the consumption of the richest quintile be reduced by only about 1 per cent.

Thus, not only will poorer households face an increase in the tax burden which is a higher proportion of their spending than for better-off households, but they will also economise the most on fuel even though they already consume the least.

Figure 4.1 shows that the distribution of additional tax payments across households would be highly regressive. The increase in indirect-tax payments would be higher as a percentage of pre-reform expenditure for poor households than for better-off households.

Figure 4.2 shows the change in fuel consumption in volume terms, for the full sample, divided into income quintiles. This shows the much greater percentage reduction in energy consumption by poorer households than by richer households in response to the tax change. The poorest quintile would be expected to cut their consumption by around 9 per cent compared to around 1 per cent for the top quintile. Moreover, since the initial fuel consumption of the richest 20 per cent of households is only some 30 per cent higher than the fuel consumption of the poorest 20 per cent of households, the larger percentage change in fuel consumption by poor households also corresponds to a larger absolute reduction in the quantity of fuel consumed.

Figures 4.3 to 4.6 compare the effects on pensioner households and non-pensioner households separately. Figures 4.3 and 4.4 illustrates the distribution of the tax burden and the consumption response to the tax across the pensioner population. The income quintiles shown are based on the income distribution within the pensioner population, and do not therefore correspond to the same income ranges as in Figures 4.1 and 4.2. Figure 4.3 shows that within the pensioner population, as amongst all households, the distributional impact of the imposition of VAT on domestic energy would be regressive. However, even among the richest pensioners the increase in indirect tax payments as a proportion of spending is high (1.4 per cent) compared to the richest quintile in the full sample (0.6 per cent). This is partly a reflection of the fact that pensioner households tend to be concentrated in the lower end of the

population income distribution; it also reflects the above-average energy spending shares of pensioner households compared to non-pensioner households with similar incomes (as shown in Figure 3.2).

Figure 4.4 shows the implicit consumption changes corresponding to the results shown in Figure 4.3 for pensioners. This figure shows that the percentage change in fuel consumption in volume terms is broadly constant across income groups among pensioners. The changes in consumption once more correspond to those among the lowest two income quintiles of the whole sample, indicating that pensioners are concentrated among these deciles.

In Figure 4.5 and 4.6 we compare these patterns against those for non-pensioner households. Again, the quintiles shown in the figures are quintiles from within the non-pensioner population, and therefore reflect different income levels to the quintiles in Figures 4.3 and 4.4 for pensioners. Figure 4.5 shows the distribution of additional tax payments for non-pensioners; as before, there is a regressive pattern across the income distribution. These tax increases are, however, much lower on average for non-pensioners than pensioners. The lowest non-pensioner income group sees its indirect tax bills increase by 1.7 per cent of spending compared to 4.6 per cent for the poorest pensioners, a marked difference, even allowing for the income differences between the two groups.

Figure 4.3. Increase in indirect tax payments of pensioner households if VAT imposed at 17.5 per cent, as a percentage of total spending, by quintile groups of net equivalent pensioner household income, Great Britain, 1991.

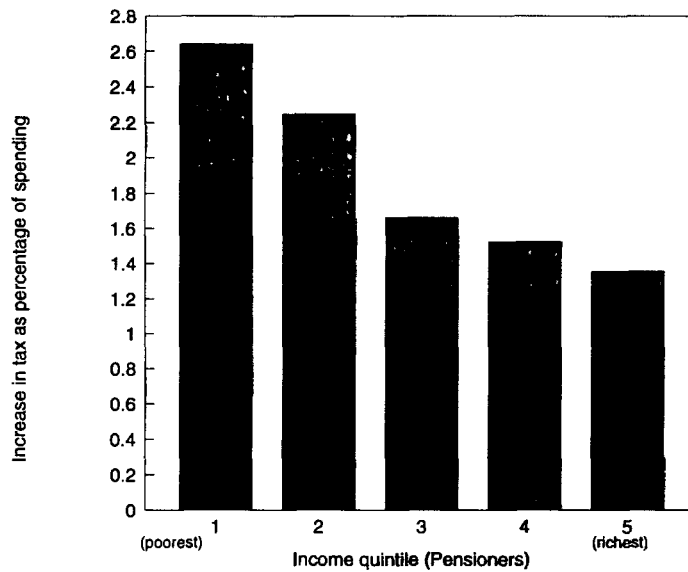
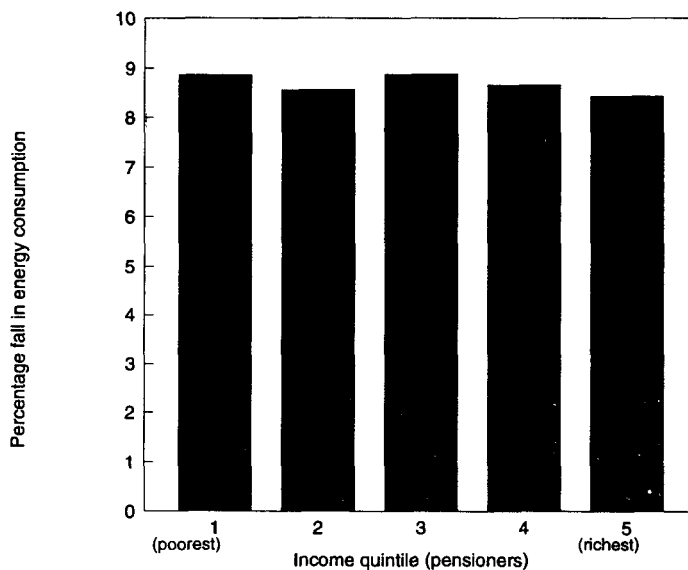


Figure 4.4. Percentage reduction in domestic energy consumption in volume terms amongst pensioner households if VAT imposed at 17.5 per cent, by quintile groups of net equivalent pensioner household income, Great Britain, 1991.



Source, Figures 4.3 and 4.4: IFS estimates based on Simulation Programme for Indirect Taxes.

Figure 4.5. Increase in indirect tax payments of non-pensioner households if VAT imposed at 17.5 per cent, as a percentage of total spending, by quintile groups of net equivalent non-pensioner household income, Great Britain, 1991.

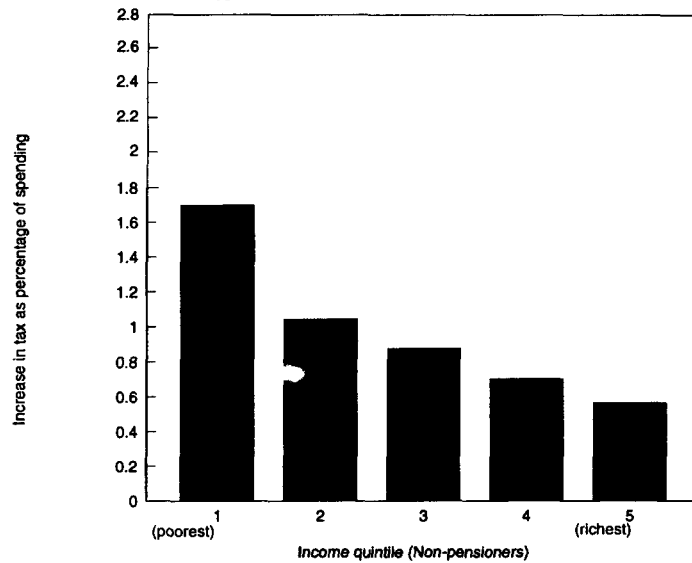
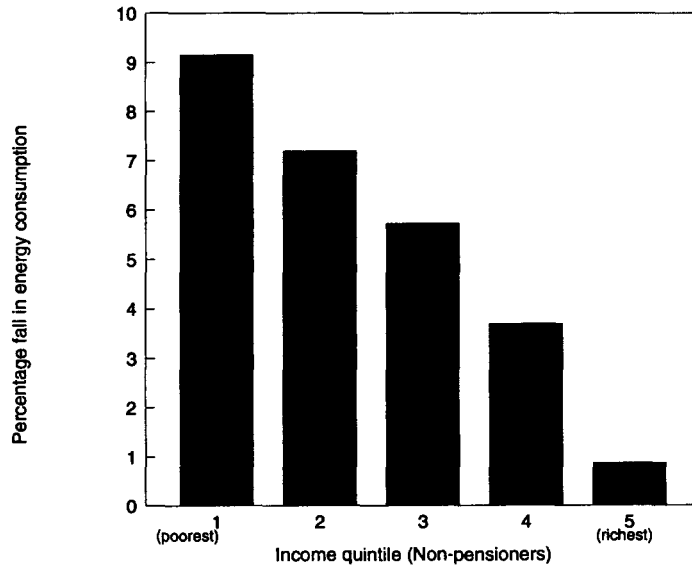


Figure 4.6. Percentage reduction in domestic energy consumption in volume terms amongst non-pensioner households if VAT imposed at 17.5 per cent, by quintile groups of net equivalent non-pensioner household income, Great Britain, 1991.



Source, Figures 4.5 and 4.6: IFS estimates based on Simulation Programme for Indirect Taxes.

5 Policy measures to offset the impact on poorer households.

5.1 Automatic compensation

The implications of the imposition of VAT on fuel for the social security budget fall into two categories - automatic ones consequent on the RPI effects of the VAT increase, and discretionary ones depending on whether the Government chooses to make additional compensation to benefit recipients. We consider each in turn.

Social security benefit rates for April of a given year are typically set on the basis of price increases in the year to the previous September. Thus in April 1993 the basic state retirement pension was increased by 3.6% in line with the increase in prices in the year to September 1992. Whilst most benefits are increased in line with all-items RPI, the rates of income-related benefits such as Income Support and Housing Benefit are typically increased in line with the increase in the so-called "ROSSI" index which excludes housing costs. Benefit levels for April 1994 will be set on the basis of inflation in the year to September 1993, and will therefore be unaffected by the planned imposition of VAT on domestic fuel.

The first occasion on which the VAT increase will affect the level of benefit uprating will be April 1995. In this case the inflation rate to September 1994 will incorporate the first stage of the VAT increase and so benefit levels will have to rise by more than would have been necessary in the absence of the change. The amount of the extra increase depends on how far the VAT increase is passed on to consumers. Assuming that fuel prices rise by the full 8%, and given an RPI weight for fuel of just under 5%, this suggests that the inflation rate used for benefit uprating will be around 0.4% higher. On the basis of planned social security spending of £87 billion in 1995-96, this will add around £350m to public spending in that year.

Just as benefit rates begin to reflect the 8% VAT rate however, the next round of VAT increases will be imposed. The full 17.5% rate will add a further 0.4% to the price level and hence to the inflation rate in the year to September 1995. This in turn will feed through into higher benefit rates in April 1996 which will add a further £350-£400m to total spending. In sum, automatic benefit compensation is likely to account for around £750 million per year, compared with the £3,000 million annual yield from VAT on fuel when fully implemented.

Whilst the effects of VAT will feed through automatically into benefit levels in the way described, there are a number of reasons why the Government may wish to consider providing additional compensation to certain groups of households through the social security system. We consider these below.

5.2 The case for discretionary compensation

5.2.1 Delay

As noted above, there is a considerable lag between the time when benefit recipients begin to pay higher gas and electricity bills and the time when their benefits are increased to take account of the VAT change. In principle there would seem to be a case for some additional compensation to ensure that vulnerable groups do not reduce their energy consumption below desirable levels simply out of financial necessity.

As against this, it should be noted that the problem of delays between price changes and benefit changes is not unique to the issue of VAT on fuel. A price change which affects the RPI will not affect benefit levels for at least 6 months, and on average some 12 months. In periods where prices are changing rapidly, the inflation rate on which a given April's uprating is based can be significantly different from the rate prevailing at the time of the uprating. Furthermore, in some cases this can be to the benefit of recipients. Thus the April 1993 uprating was by 3.6% when the inflation rate in the year to April was only 1.3%. In this context, delayed compensation for an RPI effect of 0.4% may seem less important. However, the effect of VAT on fuel as measured by the RPI may itself be a poor guide to its impact on the living standards of many households on benefit and it is to this issue that we now turn.

5.2.2 General Limitations of the RPI

Leaving aside the issue of timing, we might expect that *on average* RPI-linked benefit increases would compensate low income households for the effects of VAT on fuel. However, the RPI as currently constructed may fail in this respect because the weight it accords to domestic fuel expenditure is lower than that experienced by most low income households. There are three main reasons behind this.

In the first place, the weights in the RPI do not reflect the spending patterns of all households. The spending patterns of "atypical" households such as the very wealthy at one extreme, and poorer pensioner households at the other, are excluded when the RPI is constructed. The most important of these exclusions is that of pensioners who tend to have relatively high levels of fuel consumption. The net effect of this omission is therefore to give fuel too little weight in the RPI.

Secondly, even if the RPI took account of the spending patterns of all households, RPI-linked benefit increases would still fail to give adequate average compensation to the benefit-receiving population. This is because, as has been discussed earlier,

low income households as a group tend to spend a larger proportion of their income on fuel than richer households. Thus the RPI fuel weight will be too low for the benefit-receiving population and hence the average compensation afforded by RPI-linked benefit increases is likely to be inadequate.

Finally, another feature of the RPI which tends to amplify these problems is the fact that it is, in some sense, a rather "undemocratic" index. This is because the method used to weight expenditures is such that the more a household spends, the greater the effect its spending patterns have on the final index. Thus the spending pattern of a high-spending, wealthy household is given more weight than that of a poor household. The eventual weight for fuels is therefore lower than it would be under a more egalitarian measure.

These concerns over the RPI would be a second reason why the Government may wish to consider discretionary benefit increases over and above those which would automatically follow from any price change which affected the RPI.

5.2.3 Variation in Individual Circumstances

We have seen so far that "automatic" benefit increases in response to the imposition of VAT on domestic energy are likely to be late, and will not on average provide adequate compensation for benefit recipients. If these were the only problems, then a relatively simple compensation mechanism could be devised, perhaps involving a slightly higher across-the-board benefit uprating in April 1994 which would prevent losses among low income households. There is however a general problem which is that whilst such an approach would *on average* compensate poorer households, among these poorer households there would in practice be both gainers and losers depending on the fuel consumption of the particular household.

As we have discussed, a number of factors will lead to variations in the share of fuel in total spending between different low income households. The most obvious factors include regional variations in temperature, differences in the quality and extent of insulation and differences in the efficiency of domestic heating appliances. The share of fuel spending will also vary with the presence of particular types of individuals such as the elderly, the sick or disabled, and infants. Whilst the social security system would be ill-equipped to deal with some of these factors, there are mechanisms which could be used to ensure that some of these sources of variation are taken into account when designing a compensation package. Some of the options are set out in Section 5.3 below.

5.2.4 People who miss out

A final reason why the Government may wish to consider designing a discretionary compensation package is that a number of low income groups may receive little or no compensation from the automatic process of benefit uprating. The main groups involved here are those who fail to take-up their entitlement to benefit and those who, by dint of having savings in excess of particular thresholds or for other reasons, are disqualified from benefit. It might be argued that both of these categories could include low income households and that measures would be needed to ensure that such households were not left wholly uncompensated for the VAT increase.

It is, however, difficult to see how the social security system could be used to assist these groups. Considering first those who currently fail to take-up their entitlement to benefit, it would seem reasonable to suppose that the same factors which cause them not to take up their basic benefit entitlement would also apply to any entitlement to compensation for VAT on fuel. Furthermore, it is possible to exaggerate the extent of the problem of non take-up. Latest estimates by the Department of Social Security¹⁰ suggest that for every £10 of Income Support available to be claimed around £9 is taken up. In addition, those who fail to take up benefit typically have relatively small entitlements or choose to be supported by other family members (usually parents). Thus whilst the problem of non-take-up should not be ignored, it is not of itself a reason for the Government to devise compensation measures beyond those arising from the operation of the social security system.

As regards those disqualified from benefit because of savings, it would be inconsistent of the Government to offer help for the extra expense of VAT on fuel when it does not pay benefit to cover basic living expenses. If the rationale for disqualification from benefit is that individuals with significant savings do not need additional financial support, then this would presumably apply in respect of meeting the costs associated with VAT on fuel. Again, if the principle behind the existence of capital rules is accepted then this group should not be treated in a different way in the case of VAT on fuel.

Of all these arguments, the one likely to carry most sway with the Government is that of delay in benefit uprating. As foreshadowed in the March 1993 Budget, the Government seems likely to announce some discretionary benefit increases in the unified Budget in November 1993 to take effect from April 1994. In the next section we consider the main alternative approaches to social security-based compensation.

¹⁰ Department of Social Security (1993), *The take-up of income related benefits 1989*.

5.3 The options for discretionary compensation

If the main justification for a discretionary compensation package was the time lag between the imposition of VAT on fuel and the resultant benefit increase, then the most logical compensation package would be to bring forward the additional 0.4% benefit increase due in April 1995 to April 1994. This would add approximately £330m to the social security bill in 1994-95.

Similar reasoning would seem to suggest that the uprating in respect of the second VAT increase should also be brought forward (to April 1995). However, since the relevant inflation rate will by this point incorporate a 0.4% increase (from the first VAT increase), then normal RPI uprating will automatically have the effect of providing advance compensation for the second increase. Finally, some under-indexation of benefits might then take place in April 1996 to avoid giving compensation twice over - once through discretionary compensation and once through the automatic effects of the RPI.

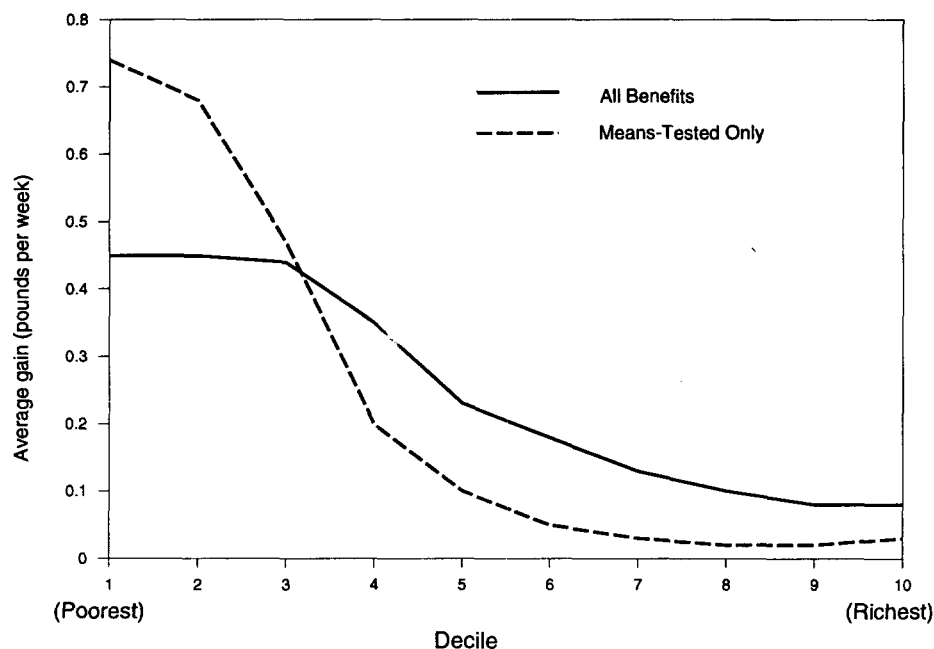
Considering the effects of the first element of this package, Figure 5.1 shows the distributional effects of a 0.4% increase in all social security benefits with effect from April 1994.

Figure 5.1 shows that an increase of 0.4% on all social security benefits would increase household incomes by about 25p per week, with average gains of around 45p per week for the poorest households but with the richest households gaining around 10p per week. The gains amongst richer households come primarily from the increases to Child Benefit which goes to all families with children, regardless of the income of the family.

The dashed line on Figure 5.1 shows the distributional effects of spending the same amount of money on increasing means-tested benefits only. Income Support, Housing Benefit, Family Credit and Council Tax Benefit rates are all increased by around 0.8%, but the Retirement Pension, Child Benefit and other benefits are left unchanged. In this case gains are much more focused on poorer households, with average gains of around 70p per week for the poorest fifth of the population.¹¹

11 The small gains amongst the richest households reflect the fact that even the richest households can contain individuals in receipt of means-tested benefits. This is because only the income of the immediate "benefit unit" is taken into account when assessing benefits rather than the income of all household members.

Figure 5.1. Effects of compensation for VAT on domestic energy via a 0.4 per cent increase in all benefits, or by an equal-cost increase in means tested benefits only, by decile groups of household income.



Source: Estimates from IFS Tax Benefit model.

This analysis does not take into account the possibility that some of the increase in means-tested benefits would not be taken up by those who were entitled. However, as has been discussed, take-up of the main "safety net" benefit (Income Support) is in excess of 90% and so the assumption of full take-up is unlikely to be seriously misleading. Furthermore, many of those who fail to take up benefit are young single people living with their parents, and as such would probably not in any case be responsible for paying fuel bills.

Whilst a package of this sort might satisfy the problem of delayed compensation, it would do nothing to deal with the equally important problem that fuel is a much more important item in the budgets of the poor than it is in the "basket" of goods used to construct the RPI. One response to this problem would simply be to increase benefits by more than the 0.4% RPI effect, either across the board or focussed on means-tested benefits. However, given the tight constraints on public expenditure and in particular on the "non-cyclical" aspects of the social security budget, any largesse is likely to be strictly limited.

Table 5.1. Selected Income Support Premia in 1993-94.

Premium Group	Size of Premium (£ per week)
Family	9.65
Lone Parent	4.90
Pensioner (60-74)	
Single	17.30
Couple	26.25
Pensioner (75-79)	
Single	19.30
Couple	29.00
Pensioner (80 and over)	
Single	23.55
Couple	33.70
Disability	
Single	18.45
Couple	26.45

One way in which the Government may seek to focus discretionary help still further is to take advantage of the "premium" structure of means-tested benefits. All claimants are entitled to basic personal allowances in respect of themselves and any dependent children, but members of particular "premium groups" are entitled to additional help. The main premium groups and rates of Income Support for 1993-94 are shown in Table 5.1. (A similar structure applies in the case of other means-tested benefits).

In the context of compensation for VAT on fuel, the group which has attracted most attention is the elderly. On the basis that their fuel share is approximately twice that of the population as a whole, there would be a strong case for increasing their Income Support rate by roughly twice as much as that for non-pensioners. This implies the changes to premium rates (all calculated at 1993-94 prices) shown in Table 5.2.

Table 5.2. How much do pensioner premiums have to rise to give pensioners twice as much support as non-pensioners?

Income Support for: (£ per week)	Married Pensioner (Aged 60)	Single Pensioner (Aged 80)
Currently Comprises:		
Personal Allowance	69.00	44.00
Premium	26.25	23.55
TOTAL	95.25	67.55
Target increase of 0.8% gives:	96.00	68.10
less personal allowance + 0.4%	(69.30)	(44.20)
equals new pensioner premium	26.70	23.90

Source: Estimates from IFS Tax Benefit model.

A package of this sort which targeted additional help on the poorest pensioners would cost significantly less than £100m over and above the £330m estimated cost of providing an across-the-board increase of 0.4%. Some variation on this theme is the Government's most likely response to the political pressure for compensation for vulnerable households.

6 Conclusions

The Government's decision in the March 1993 Budget to impose VAT on domestic energy was primarily motivated by the need for additional tax revenues to reduce the size of the public sector deficit. Once at its full 17.5 per cent level, VAT on domestic energy should raise an additional £3 billion or so in tax revenue.

The extension of VAT to domestic energy has been presented as consistent with the UK's commitment to the UN Convention on Climate Change, which aims to halt global warming by restricting emissions of carbon dioxide. In comparison with the proposed European carbon tax, imposing VAT on domestic energy in the UK is likely to be less efficient at restraining carbon dioxide emissions - it does not differentiate between high-carbon and low-carbon energy, and it does not affect non-domestic energy use. Also, unilateral national measures may be less effective at inducing other countries to follow suit than coordinated EC policy. Nonetheless, VAT on domestic energy would broadly increase the average price of domestic energy by the same amount as the EC carbon tax at its full level, and would be expected to have an appreciable impact on domestic energy use, reducing domestic energy use in volume terms by some 6 per cent in the short run.

Much of the concern about VAT on domestic energy has had to do with its impact on poorer households; although poorer households spend less on energy than better-off households, their spending on energy is a larger share of their total spending. The simulations reported in Section 5 of this paper suggest that the extra tax paid by the average household would be equal to approximately 1.1 per cent of total spending; for households in the bottom 20 per cent of the income distribution, however, the extra tax would be a greater proportion of total spending - about 2.0 per cent. Poorer households would also bear the brunt of the induced reduction in energy spending: the poorest 20 per cent of households would cut their energy consumption by some 9 per cent in volume terms, compared to 6 per cent on average, and only 1 per cent by the richest 20 per cent.

Automatic indexation of social security benefits will provide a substantial amount of compensation for the extra energy spending of poorer households; it will also use an appreciable proportion of the revenues - some £750 million of the £3 billion extra tax when VAT is imposed at the full 17.5 per cent rate.

There are three main drawbacks of relying on indexation alone to compensate poorer households; the indexation is based on the pattern of spending of the average household, which understates the importance of energy in the spending of poor

households; compensation through indexation will arrive "late", in that benefits will not be increased until well after the imposition of VAT on domestic energy; and compensation based on average spending fails adequately to compensate households with higher-than-average energy needs, such as the elderly.

Two possible discretionary measures which might be used to supplement the effects of automatic indexation might be considered. The first would be accelerated indexation of social security benefits in the first year, to ensure that indexation took effect at the same time as the increase in VAT on domestic energy; this would add an extra £330 million to the social security bill in 1994-95. The second possible measure might be to give additional help to pensioners, reflecting the higher-than-average importance of energy spending in the budgets of the elderly, and concerns about the needs of the elderly for adequate heating; doubling the compensation given to the elderly, through increases in Income Support pensioner premiums, would add less than £100 million to the cost of indexing social security benefits.

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Appendix: The IFS Simulation Programme for Indirect Taxes (SPIT).

The IFS Simulation Programme for Indirect Taxes (SPIT) used for the analysis in this paper is a micro-computer based simulation package designed to analyse the consequences of reforms to the indirect tax system on household expenditures and tax revenue. The results generated by the program can be used to predict aggregate changes in government revenues and patterns of consumers' expenditure as well as to analyse the distributional effects of tax reforms at the household level. For a detailed description of SPIT see Baker, McKay & Symons (1990) and Baker & Symons (1991).

In general the development of the simulation package can be sub-divided into two parts. First, changes in the structure and levels of indirect taxes alter retail prices. The prediction of the resulting changes in consumer behaviour requires behavioural models of household expenditure decisions and the econometric estimation of these models. The theoretical model underlying SPIT is an extension of the well known Almost Ideal Model of Deaton and Muellbauer (1980).

Second, in order that the results of the model may be used to analyse the consequences of tax reforms, the results from the econometric model have been incorporated into micro-computer based simulation routines.

The simulation packages and the econometric models of consumer demand upon which they are based make use of an extensive database of household level information drawn from 17 years of the Family Expenditure Survey (FES). It is this microeconomic foundation which allows these models to explicitly analyse household behaviour.

Data

The FES is an annual random survey of approximately 11,000 households of which around 7,000 normally respond. In the main, expenditure data is collected in the form of two-week diaries completed by each adult member of the household. The survey also records detailed information on a variety of household characteristics such as household composition, income, tenure type, region, population density and ownership of various consumer durables (cars, central heating etc.).

Data on household energy spending in the FES is collected in three ways. Spending on gas and electricity by households receiving quarterly bills in arrears is recorded based on the most recent quarterly bill received. The spending of households paying for energy through a continuous direct debit arrangement is recorded on the basis

of average energy spending over the past year. Other energy spending, including purchases of coal and bottled gas, and spending on energy paid for through a slot-meter arrangement, is recorded in the household's spending diary for the fortnight during which the diary is kept.

The FES has been frequently used to analyse consumers expenditure behaviour, relevant examples are: Atkinson and Stern (1980) on the effects of shifting from direct to indirect taxes, Pollack and Wales (1981) on the role of demographic characteristics in demand analysis and Atkinson, Gomulka and Stern (1989) on modelling alcohol expenditures.

Consumer spending model

Estimation of the econometric models underlying the simulation programmes takes place over a pooled sample of annual FES data sets. This approach allows the models to exploit the informational content of both the annual cross-sectional surveys, as well as trends in prices over time. The ability to incorporate household characteristics within the estimated equations is a major attraction of using household data. Estimates based upon micro-data show that cross-sectional variations in characteristics play an important role in determining expenditures. Moreover, where characteristics display not only cross sectional variation within sample periods, but also time series variation in their distributions, it is unlikely that aggregate models will estimate the true preference parameters of interest.

The data underlying the model upon which SPIT is based is a pooled sample of the FES from 1974 to 1986 utilising information on over 116,000 households in Great Britain. The econometric model embedded in SPIT assumes that households make their budgeting decisions in two stages. At the first stage total income is allocated between saving, durable expenditure and total "non-durable" expenditure. At the second stage total "non-durable" expenditure is allocated to the broad categories of consumption goods. Hence durable and housing expenditure are treated as separable from expenditure on all other goods.

Estimation takes place for 14 commodity groups: beer, wines, spirits, food, fuel & light, clothing, household services, personal goods & services, leisure goods, leisure services, fares & other travel expenses, tobacco, motoring (excluding petrol), petrol. Economic theory requires that certain restrictions are placed upon the values of the estimated parameters. These restrictions not only apply within each individual expenditure equation, but also across expenditures as a whole. Consequently, to

impose the restrictions across different equations, expenditures are estimated within the context of an overall demand system rather than by estimating each equation separately.

The econometric model in SPIT was estimated over all household in the FES (excluding N. Ireland) with households grouped according to whether they included smokers and/or had access to a car (with appropriate terms included to account for sample selection bias). This enabled not only the effects of demographic characteristics, but also price and income responses to differ between the four household groups.

Simulation Package

Having estimated the demand systems, the price and expenditure parameters recovered from them are then fed into the simulation package.

The simulation program itself runs on one whole year of FES data and in SPIT earnings and prices can be up-rated to current values.

The simulation routine calculates the implied price effects of a given reform and then uses the information from the econometric model to calculate the effects on consumers' expenditure shares. The effects of tax changes on commodity expenditures, are then calculated and grossed up to national levels to predict aggregate changes in consumer expenditure and government revenue.

The version of the model on which the simulations in this report are based conditions on housing tenure and durable dummies; in other words, it takes housing tenure and durable ownership as given, exogenous, variables, rather than allowing these variables to adjust in response to the changes in taxes and prices being analysed. In this sense it can be termed a "short-run" model in that prices and income terms depend on households maintaining the same stock of durables and tenure. The term short-run does not refer to a particular time period (and in this sense differs from the concept of the short run often employed in models based on time-series data), but it may be thought of as relating to the period within which households are unable to change their stock of durable goods (washing machines, type of central heating etc) or their housing tenure.