

4. HOUSEHOLD INCOME EFFECTS AND IMPLEMENTATION OPTIONS

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4.1 Introduction

Market-based policies to protect the environment have not been widely applied in Ireland. At a time of high levels of construction and investment in equipment, the opportunities foregone could be sizeable. The regulatory regime is helping to promote the adoption of environment-friendly technologies but there is considerable scope for reform of the fiscal system² and for applying the polluter pays principle in order to rectify the incentives. In the absence of correct incentives, the regulatory regime operates in an unsupportive environment. It is not possible to regulate every micro-decision and it is likely that new equipment and buildings embodying sub-optimal technology are being installed alongside reinforcement of inappropriate lifestyles and habits.

A possible reason for slow adoption of market-based instruments is concern for distributional issues, that is, the effects on household incomes and particularly on households with low incomes. If we take the example of a road-pricing trial in Dublin, two disadvantages of this market-based option were strongly perceived. These were that such a measure would be “unfair to the less well-off” and “an additional tax” (O’Mahony *et al.*, 2000). When recommending market-based policies therefore, one should think carefully about the results for different income groups, that is, the so-called distributional consequences, and how to adjust the tax burden overall.

Various distributional issues have been investigated by the OECD (1995, 1996), Scott (1992, 1996), Barker and Köhler (1998) and van Humbeeck (2000), for example. However, measures to address the issues could benefit from more focused investigation. Revenues from environmental taxes and charges accrue to general government for redistribution in some chosen manner, but if the final impact increases inequality we will call this result regressive. This paper looks at the options

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² EPA (2000), Barrett *et al.* (1997).

for avoiding or offsetting any regressive effects that would result from the introduction of market-based instruments.

For illustrative purposes, the paper uses three examples of market-based instruments for protecting the environment that are under discussion to a greater or lesser extent. The examples are (1) carbon taxes (or tradable permits), (2) charges for household waste disposal and (3) water service charges. The paper proceeds as follows. The next section describes for each example in turn the distributional effects on households in different income groups and any special issues arising. The third section looks at means for offsetting the adverse distributional effects. The paper concludes with final comments.

It is important to note that we are not talking about policies that would constitute additional taxes but, rather, about reassigning the take from one to replace another. These three examples therefore do not constitute an extra tax. The policies would be broadly revenue-neutral, compared to the baseline or business-as-usual policy. For example, the carbon tax could replace some other tax, and the environmental service charges could be associated with a reduction in the Exchequer provision to local authorities and hence in income taxes, for example. The final outcome is not a rise in taxation overall; instead, one form of tax or payment is replaced by another that is designed to improve the structure of incentives.

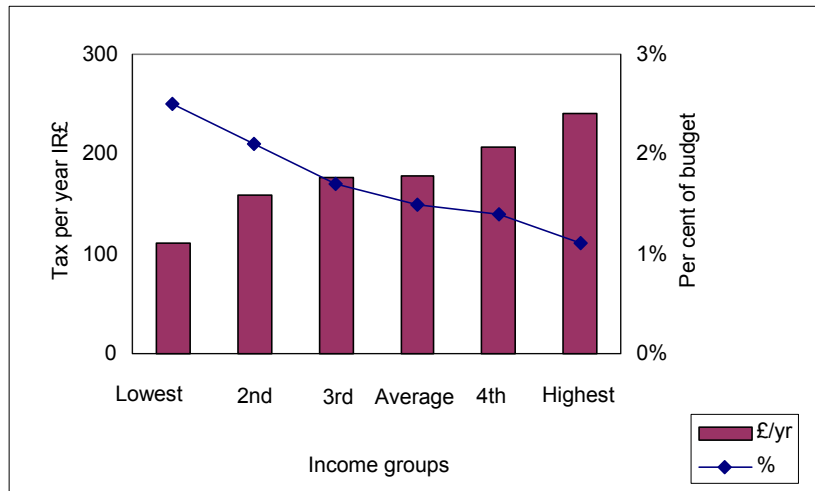
4.2 Distributional Effects Outlined

It is assumed that we want to avoid a policy that is regressive, that is, where the financial effects leave poor households relatively worse off. A preferred policy is assumed to be one where the overall result is either neutral in its effects on different income groups, or possibly progressive. A policy that leaves everybody better off but leaves society more unequal is still described here as being regressive.

4.2.1 CARBON TAXES

As is well known, the effects of carbon taxes implemented on their own are regressive. Estimates from an early study are reproduced in Figure 4.1, which shows the amounts of carbon tax that would be paid under the European Commission's original proposal in 1991 for a carbon tax, set at \$10 per barrel of oil equivalent. The descending line gives the tax as a percentage of the household budget (using the right hand side axis). Low-income households would have found themselves paying in the region of an extra 2½ per cent on top of their weekly budget, compared to about an extra 1 per cent by the top income group. Publication shortly of the 1999/2000 Household Budget Survey will allow new estimates to be made. These effects would not in fact materialise fully until

Figure 4.1: Effects on Households in Various Income Groups of the EC's Original Carbon Tax Proposal of 1991, (implemented on its own, that is, without considering the respending of government revenue)



Source: Scott 1992.

the tenth year, the introduction of carbon taxes being pre-announced and gradual. The results may be less regressive if the tax were introduced now because of the switch in the meantime by low-income households away from solid fuel to natural gas, but the general result could be similar. Though the absolute amount of carbon tax paid is higher for higher incomes, its *share* of the household's total budget is higher for poorer households, for the well-known reason that expenditure on energy forms a higher share of poorer households' budgets and the fuels they use have a higher carbon content. Inequality would increase. Revenues from carbon taxes would be large – some three-quarters of a billion pounds in the early proposal studied by Fitz Gerald and McCoy (1992) – so that the State would have no shortage of means to rectify regressive effects but, as noted in the conclusion to the study, “care will need to be taken to remove the regressive effect”.

Distributional consequences of carbon taxes ultimately depend on policies adopted, the way in which the revenues are recycled in the economy and on how the economy responds to such a fiscal shift. The effects of carbon taxes implemented on their own as illustrated above are only a small part of the final impact – but they are the most immediately visible part. People would need to be convinced that these effects would not be the end of the matter. The adjustment processes are likely to be extensive, and investigations of their effects are generally conducted within the framework provided by a model of the overall economy, such as a medium-term macroeconomic model, which has been adapted to look at final distributional effects. We will discuss here two such investigations for Ireland, one by a team in Cambridge, the other at the ESRI mentioned above.

The Cambridge study,³ by Barker and Köhler (1998), in which revenues from the carbon tax are assumed to be recycled to reduce employers' contributions to social security schemes, broadly endorsed the

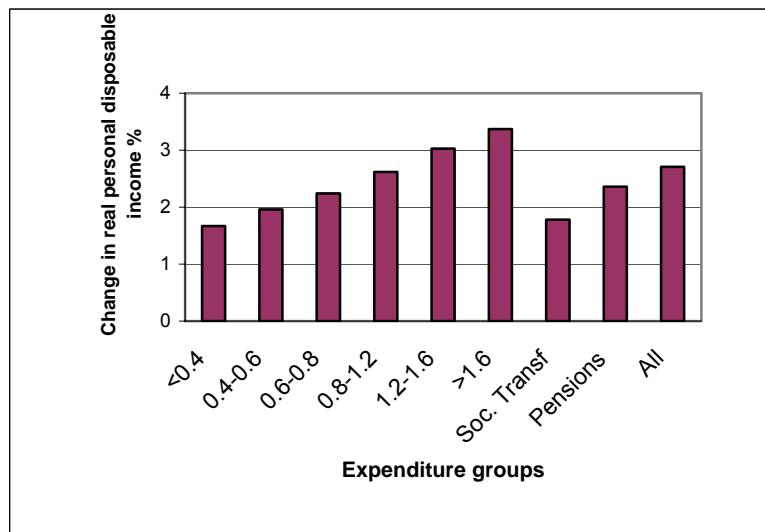
³ Barker and Köhler use the E3ME model (Energy-Environment-Economy Model for Europe, a disaggregated time-series, cross-section econometric model) which was constructed by a team of partner institutes across Europe, co-ordinated by Cambridge Econometrics.

favourable economy-wide results of the earlier study by Fitz Gerald and McCoy (*op. cit.*). Barker and Köhler reported on the effects of additional excise duties for EU member states for the period 1999-2010, again graduated according to carbon content of energy products. The additional duties were calculated to achieve an overall reduction of 10 per cent in CO₂ emissions below the baseline or business-as-usual situation. By contrast with the Commission's original \$10 per barrel of oil equivalent at 1993 prices, the required tax here was estimated to be \$16 per barrel of oil equivalent at 1999 prices.

Their results showed a small rise in Ireland's GDP (0.8 per cent above the baseline, by 2010) and a small rise in employment (1.5 per cent). Emissions of CO₂, constrained to decline by 10 per cent by 2010 for EU countries combined,⁴ were predicted to fall by 10.9 per cent in Ireland. The preceding calculations by Fitz Gerald and McCoy for the earlier period had given GDP growth and employment growth of 0.4 per cent and of 0.7 per cent, respectively, and a decline in carbon emissions of roughly 3 per cent. Both studies showed small but positive results for the economy, of similar orders of magnitude.

Important new material in Barker and Köhler's study was the estimated distributional effects of the reform package as a whole. Built in to the study was the assumption that social transfers and pensions would be increased at the same rate as the increase in wage rates. They found that the extra employment would offset some of the immediate regressive effects, given that low-income households are likely to benefit more than other households from reductions in unemployment. Figure 4.2 shows their estimated overall percentage change in real personal disposable income for eight income groups. These groups represent adult-equivalents⁵ and range from those with less than 40 per cent of the average expenditure to those with 160 per cent or more of average expenditure, which in fact means that only the lower income groups of the population are covered by the results. Also shown are the groups living on social transfers and on pensions.

Figure 4.2: Ultimate Gains in Real Personal Disposable Income from Duties on Carbon and Reductions in Employers' Contributions to Social Security, Ireland 2010



Source: Barker and Köhler, 1998.

Note: The horizontal axis shows household groups classified according to their expenditure, expressed as a share of average national expenditure.

The authors note that:

... every expenditure group in every member state in the analysis benefits from the tax shift, with the extent of the benefit ranging from the lowest of 0.01 per cent for real personal disposable income in households with under 0.4 of the mean expenditures in Spain to the highest of 4.17 per cent for the highest expenditure group in Belgium.

However, although all groups gain, the authors call the outcome “weakly regressive”, in so far as low-income and vulnerable groups benefit less than the average of all households and income disparities are increased.

4.2.2 DISTRIBUTIONAL EFFECTS OF DOMESTIC REFUSE CHARGES

Domestic refuse services are partially subsidised but charges are increasingly being imposed and more of the undertakings are being contracted to private operators. About a third in 1995 and now just under half of the eighty-eight authorities with responsibility for refuse have sub-contracted to private operators. A further 16 have mixed private and authority-operated services. Only in about a third of authorities is the service now provided by the authority alone (Curtis, 2001).

Volume-related charging, in the form of a charge per bag or per tag, has become more widespread with some twenty-six authorities charging in this manner. Eighteen of these twenty-six volume-related charging schemes are privately operated, four are mixed private/authority operated and only four are operated by the authority alone. In other areas, the charging regime consists solely of a flat fee (thirty-seven authorities), and the service is provided “free” by three authorities. In some areas there is a fee per 240-litre bin and fees may be differentiated by bin size; but this is not likely to be common.

A preliminary analysis of volume-related charging was undertaken by Lawlor (1996) and a “before and after” study of the effects of weight-based charging, funded by the EPA, is underway at present by Barrett and Curtis (forthcoming).

This forthcoming analysis will advance the discussion but, as of now, the picture can be characterised as one in which the majority of households are charged an effective flat-rate annual fee, and a volume related fee or nothing at all is charged on the rest. Though subject to a wide range, flat-rate fees cluster in the region of £100 to £135 per year. The flat-rate fee is obviously regressive, representing 1 per cent or more of net household income for quintile 2 and but a quarter of that for the highest group. A zero charge, by comparison, may be progressive in so far as payment through the tax system could be viewed as progressive. With local authorities now increasingly having to fund their refuse operations, the regressive effects could therefore worsen.

The point to be made here is that costs are going to rise. As landfills are operated to higher standards and with increased recycling by the

authorities, costs per household could rise to a sum closer to £200 per year. This would be nearer to 2 per cent of quintile 2's net income and less than a half per cent of the top quintile's.

If the service were charged for by volume, households would increasingly compost vegetable waste and take recyclables to recycle banks, thereby reducing their bills by perhaps a third. That of course is one of the major benefits of volume-related charging and its chief *raison d'être*. By contrast annual flat-fees do not give a reward or incentive to people to reduce the amount of waste they generate. Table 4.1 shows what people themselves think is the best way to pay for domestic refuse services, when they are presented with the financing options. The question was put to them in a survey undertaken at the end of 2000 and it replicated the question posed in a survey undertaken in 1993. Appendix 4.1 gives the question and it can be seen from the wording that respondents were thus given realistic choices as to how the increased costs of improvements in methods of waste disposal and other services could be paid for.

Table 4.1: Chosen Method of Paying for the Service Dealing with Household Garbage

| Method of Paying | 1993 Survey | 2000 Survey |
|------------------------------------|-------------|-------------|
| Increase in taxes | 3 | 13 |
| Fixed service charge | 53 | 38 |
| Charge for amount | 44 | 45 |
| "No charge, government should pay" | - | 4 |
| TOTAL | 100 | 100 |
| Number of respondents | 925 | 1,176 |

Sources: ESRI (1994, 2000).

It appears that "charging based on the amount" is now the most favoured method of charging though still not favoured by a majority, as Table 4.1 shows. Despite this being the preferred method, there is also a rise in the small numbers preferring an increase in taxes. This may reflect the recognition that general taxation could be a more progressive method of payment, that it could avoid fly-tipping which would otherwise need to be policed or, recognition by the people who have now been moved out of the tax net, that general taxation could mean payment by "somebody else". Additionally, a small group insisted that the interviewers record an additional category of response, namely that "government should pay".

4.2.3 DISTRIBUTIONAL EFFECTS OF DOMESTIC WATER CHARGES

Domestic water charges are barely on the agenda at present. However, several documents underline the future importance of water as an issue which would suggest that options on how water services are financed should be kept open.

For example, in the *Millennium Report* the EPA points to the possibility that increasing water supply infrastructure:

.... may have adverse effects on the aquatic environment, e.g., inundation of land to form reservoirs, changes in the flow regime in rivers below dams and deterioration of water quality below the discharges from sewage treatment plants.

Meanwhile, the supply of water could possibly undergo changes, though more with respect to the pattern of supply rather than to the actual quantity. The *National Climate Change Strategy* (Department of the Environment and Local Government, 2000) describes potential impacts of global warming as being likely to include:

*Significant increases in winter rainfall, lower summer rainfall causing regular water shortages especially in the midlands, east and north, and affecting both people and ecosystems. There would be less recharge of reservoirs during the summer; water shortages would occur regularly and would be longer than at present.*⁶

Recently in their environmental performance review of Ireland, OECD (2000) recommended progressive application of the

User-Pays and Polluter-Pays Principles to water pricing policy concerning both households and economic sectors, taking account of social and distributive concerns.

Given all these prompts, it would seem prudent to give some thought to the issue in the secure knowledge that it will come on to the agenda eventually, as happened with carbon taxes, first addressed ten years ago.

As is well known, domestic water service charges were abolished at the start of 1997. The diversity of the charging regime, the unaddressed difficulties it posed to some families and the absence of incentive to careful use of water meant that these charges were in need of reform in any case (Scott and Lawlor, 1997). What transpired, however, was complete abolition of domestic charges, with the funding shortfall eventually made good by other revenues including funds from central government.

Metered charging gives an incentive to careful water use thereby reducing costs overall. It is worth considering what the distributional pattern of metered charges would be if they operated for domestic water services at present.⁷ A difficulty is that information on water use is sparse at present. A feature of domestic water consumption is that use per head declines with increasing numbers of inhabitants in the household. A recent survey of 1,768 households by Anglian Water revealed the pattern illustrated in Figure 4.3. The graph shows actual water use only, with losses on the customer's premises excluded. Some of the households faced metered charges and their consumption can be seen to be below that of unmetered households. Incidentally, this pattern of higher usage per head

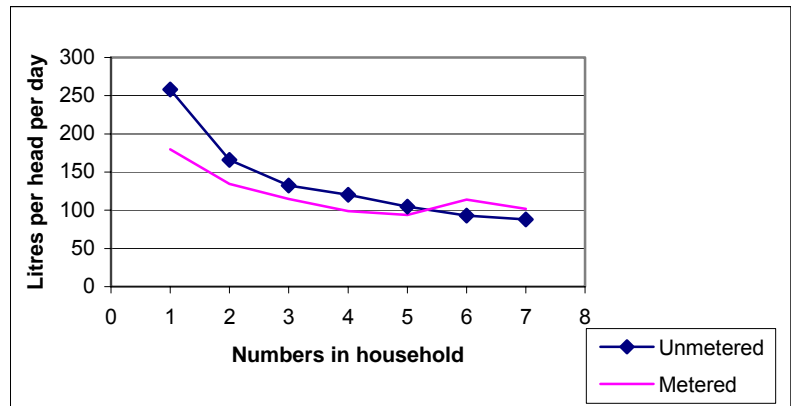
⁶ Other potential results are that the "change in rainfall patterns could cause regular water deficits in peatlands....Increased agricultural production, with new crops becoming viable and agricultural production costs reduced if prolonged summer droughts do not become a problem....Some existing forestry species may suffer (e.g. where availability of water and nitrogen are limiting factors), with others becoming more productive..."

⁷ A discussion of the costs and benefits of metering and of the methodology for analysing the metering option is given in Scott (2001).

in small households has possible implications for future demand if household size declines.

Another feature of water use is that it rises with income and with ownership of water using equipment. In our example shown in Figure 4.4 it is assumed for the sake of argument that metered water charges are applied and merely cover the current costs of operating the services, and that water supply and waste water services are charged jointly. It is emphasised that the results are speculative only and are based on ownership of water using equipment in Ireland (from the ESRI's Living in Ireland Survey)

Figure 4.3: Daily Water Usage Per Head for Different Household Sizes, from Anglian Water



Source: Anglian Water (2000). Survey of Domestic Consumption (SoDCon™).

Notes: The graph excludes losses on customers' premises. Daily losses per property in 2000 averaged 43.3 litres and 18.6 litres in unmetered and metered households, respectively, so that the curves would diverge further if losses were included.

and on usage patterns in the UK. These hybrid results are shown in Figure 4.4. Appendix 4.2 gives details of sources, calculations and working assumptions. A more refined analysis could be undertaken wherein household income groups would be measured in terms of "equivalent income", so that household income is expressed per head but adjusted to reflect the number of household members.

As shown by the plain line and right-hand-side axis in the figure, amounts charged per household could be 1.5 per cent of net income of households in the lowest net income decile, falling to 0.35 per cent for households in the highest decile. Evidently, the charge implemented on its own would be regressive.

Before proceeding to investigate the options for mitigating these regressive effects of water charges it is worth checking the evidence of public acceptance or otherwise. When told that costs of water supply were going to rise, owing to the costs of ensuring the quality of water, and that the three options were, as for refuse services above: (1) an increase in taxes, (2) a fixed service charge or (3) a charge based on the amount used, respondents' replies were as follows.

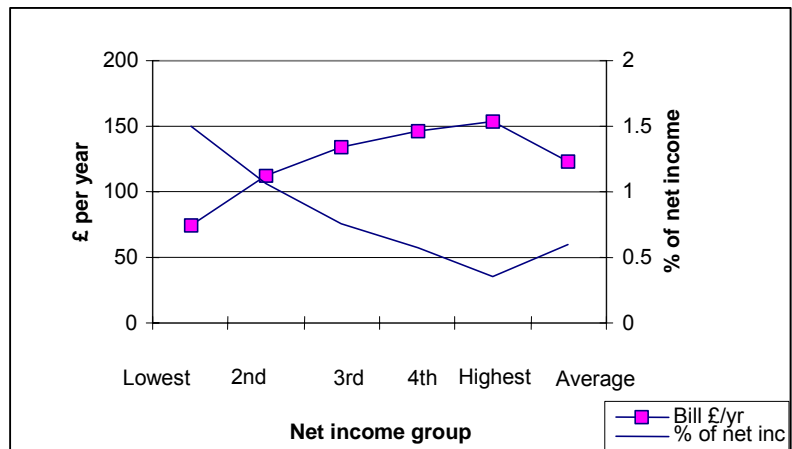
Table 4.2: Chosen Method of Paying for Water

| Method of paying | 1993 Survey | 2000 Survey |
|------------------|-------------|-------------|
|------------------|-------------|-------------|

| | | |
|------------------------------------|-----|-------|
| Increase in taxes | 2 | 12 |
| Fixed service charge | 51 | 26 |
| Charge for amount used | 46 | 56 |
| “No charge, government should pay” | - | 6 |
| TOTAL | 100 | 100 |
| Number of respondents | 919 | 1,176 |

Source: ESRI (1994, 2000).

Figure 4.4: Hypothetical Annual Bill for Water Services Broken Down by Household Income Groups and Expressed as a Proportion of Net Income



Note: Magnitudes are based on consumption figures derived for the UK and are illustrative only.

Again the option of increasing taxes is unpopular though its share rises to 18 per cent if one includes the response “government should pay”. The option of charging by amount appears by contrast to be the preferred method, and by a majority. Results of two surveys cannot be decisive but the views merit some consideration. Current costs alone of supplying water services to households have been estimated at very approximately £122 million per year. In the light of likely future rises in demands and of increased costs, commercial criteria have a role to play in water resource allocation, alongside due regard for social and distributional concerns. It is true that in the past, when water was cheap to supply and demand pressures were less, commercial considerations weighed less heavily in public and official thinking.

In the same vein, Ireland insisted that the wording in Article 9 of the EU Water Framework Directive would allow an opt-out from the requirement of full cost recovery of water services by sector by 2010 (EC, 2000). However, if Ireland could meet the social and distributional concerns and implement charging, not necessarily within the specified timeframe, then our opt-outs “could be saved” for other causes.

We have now looked at three examples of market-based policies, in the fields of global warming, refuse and water services. In the case of global warming, the weakly regressive effects were noted of the carbon tax with revenue recycling to reduce employers’ social security contributions. In the cases of the two environmental services, the strongly regressive

nature of implementing the charges on their own was described. Our attention now turns to the options for mitigating these effects.

4.3 Options for Offsetting Regressive Effects of Economic Instruments

Bearing in mind that incentives to good environmental behaviour should ideally be maintained, it would be useful to see if the option of waiving taxes and charges can be avoided. Ultimately, society will benefit from the “educational” role played by such charges, and ideally everyone should benefit from this role and not be unfamiliar with charging regimes if their financial circumstances improve or when they are confronted by charging abroad. Taking stock of the discussion so far, all three examples of market-based instruments provide revenue to, or save expenditure by, general government. The adequacy of means for compensation is not in question. These instruments can be seen as an opportunity for replacing (part of) some other tax which, unlike the proposed environmental tax or charge, might be economically distorting.

No revenue would arise however in the case of a policy that allocated grandfathered emissions permits, that is, free of charge (see the previous paper by Fitz Gerald *et al.*, in this volume). That policy would be markedly regressive because in addition to causing price rises similar to those resulting from carbon taxes, company shareholders would become owners of valuable permits. Leaving aside this example, what are the options for alleviating regressive effects?

The options and the issues arising can be described under the following headings, which start at the macro level and progress to options at micro level.

1. Reducing or altering indirect taxes. The desired reduction in regressive effects could be achieved by reducing other regressive taxes, such as VAT. Reductions in VAT may not counteract the regressivity sufficiently, though they could be helpful in the case of households where incomes were below or close to the tax threshold and which could not benefit from income tax cuts.
2. Increasing income tax thresholds, or reducing rates of tax on low incomes would confer benefits on low-income households, and also on high-income households. Allowing the environmental charge against income tax at the standard rate, as for refuse charges at present, can have roughly similar effects. Non-tax payers would not be able to benefit, however. Selective reduction of social security contributions of low-income labour would counteract regressivity. Reductions in social security contributions were already part of the package in the carbon tax analyses described above, but there may be scope for differentiated reductions.
3. An equal lump-sum amount returned to each household, corresponding to the value of the *average* environmental tax or charge, could be an effective means of offsetting regressive effects of eco-taxes and charges. Lump-sum returns are sometimes held up as the textbook “ideal” way to compensate. This is partly because low-income households consume less energy and environmental services

so that lump-sum compensation leaves them more than compensated, in contrast with high-income households which are less than fully compensated. It would guarantee to remove regressive effects. The disadvantage is that the economic benefits of reducing distorting taxes such as labour taxes are then foregone. But while foregoing this benefit, there may be practical advantages to allocating some of the funds as lump-sum returns if addressing income distribution in a visible way is more important than removing tax distortions.

The recent replacement of income tax allowances by tax credits offers just such an opportunity for lump-sum compensation, though a mechanism for awarding credits to low-income households with incomes below or close to the tax threshold would still be needed. Of the 1,769,000 people on income tax records, 668,000 are exempt from tax. They present a difficulty because they cannot benefit from a tax credit at present and the number of exemptions has increased of late as policy has aimed to reduce the numbers paying tax.

An extended version of the Family Income Supplement could be a vehicle for compensating these people. Better still might be a system of awarding “refundable tax credits”, currently being examined by a special Working Group set up under the Programme for Prosperity and Fairness. Under a refundable tax credit system some benefits could be administered by the tax system rather than by the welfare system. This would mean that those who did not have enough tax liabilities to make use of a tax credit would see their tax liability become negative, and receive a payment from the authorities.⁸ Experience elsewhere has shown that there may be some advantages to such an innovation. By its comprehensiveness it would certainly ease the task of offsetting the regressive effects of economic instruments and it would be an ideal vehicle for lump-sum compensation.

In some instances the lump-sum compensation would be more appropriate if it were awarded per head, rather than per household or family. It would then be necessary to know the numbers of persons in the household and this information might not be readily to hand to the relevant organisation. The electoral register and the children’s allowance books would go a long way to supplying the information but gaps in information spring to mind – for example children aged 16 and 17 who have left education and no longer qualify for the allowance nor for inclusion on the electoral register. (The example below of the water tariff operating in Flanders requires this information on numbers in the household.)

4. The social welfare system can be called upon in the normal way that it deals with rises in the costs of living. Pensions, unemployment benefit, family income supplement for those in work, *et cetera*, can be raised to compensate households. An example that was successful a decade ago was the introduction of the smokeless fuel allowance for Dublin. This compensated households in cash for the increased costs of smokeless coal compared to smoky coal. The difference in the case

⁸ Callan *et al.* (2001).

of the introduction of economic instruments under discussion here is, first, one of much larger scale and, secondly, the government would have the money to hand to finance the increase in social welfare expenditure.

The various options considered so far are measures that the government can introduce, through the tax system alone, through integration of the tax and social welfare system, or through the social welfare system on its own. There are other measures that are more closely focussed on specific aspects or that involve structuring the charge or tax in a particular way, as follows.

5. Subsidies to improve “technical performance” that helps the economic instrument to achieve its aim. For example measures aimed at the homes of the elderly or less well-off can have multiple benefits. Measures could include home insulation, supply of compost bins or repair of water-leakage in the home. The possibilities here are numerous and some are already in operation to some degree.
6. In the case of environmental services, the tariff structure can be manipulated to be progressive. The supplier can reduce the fixed cost element or a portion of it, where there is such a cost. However difficulties can arise if pricing principles depart from the underlying economic realities of the supply process. Neither should there be a bonanza to the supplier if the supplier is in turn compensated by government.
7. An option is to levy no charges on people below a certain threshold income. In case this risks creating a “poverty trap” whereby people are discouraged from seeking work in order to maintain their benefits, an alternative is to impose a cap on the amount that households on certain welfare payments would pay for an environmental service. The government can require companies/utilities to operate this special tariff. In the case of uncompensated private companies, cross-subsidising by other customers would be required to make up the shortfall. In the UK, for example water customers pay an extra 50 pence per year to finance the waiver or cap granted to low-income customers. Unfortunately, waivers and caps could discourage the adoption of good environmental habits on the part of recipients and should be avoided.
8. With volume-based charging, the burden of the charge can be alleviated by granting a free amount of the service to all, like a given weight of rubbish removal or volume of water per head. In Flanders, for example, 40 litres of water per head per day is given free, which is under 30 per cent of average daily consumption. The costs of this allowance are made good by a rise in the volumetric price of supplies above this threshold. Efficiency and equity are met to some extent. The free allowance has the virtue of being small enough to ensure that few households will face a zero price, so there is still an incentive for careful use. It covers a certain core water need in the home and it is fair by being allocated per head (van Humbeeck, 2000). Well-

considered schemes would still be required to assist the most vulnerable, however.

9. The most vulnerable would include those that are special cases, such as people with medical conditions that require extra energy use, water services or whatever. These special cases are already catered for in other contexts and should simply be extended to deal with environmental taxes/charges. Careful advance preparation must be undertaken.

Two general issues that could arise merit discussion here. One is the question of whether benefits in cash are better than benefits in kind. A benefit in kind that is surplus to what the household would choose to purchase if it had the equivalent amount of money, renders it less well off than it would be if it had received the money equivalent instead. This has been called “unpreferred expenditure” if by dint of having the money instead, the household would have been able to buy some different, preferred, purchases (Conniffe, 2000). (The household would then have been on a higher indifference curve.) There are arguments for benefits in kind, depending on the circumstances, and benefits in kind do play a role in the alleviation of poverty (Nolan and Russell, 2001) but benefits in cash are preferable. Allowing households no choice as to how they spend the money insures that it is spent on the item in question, but it also implies that the inhabitants should not have options. If benefits in kind are used, such as the free fuel schemes, it is important that they be as flexible as possible, in terms of fuel type and timing of use, *et cetera*, and reviewed carefully.

The second issue concerns public versus private supply. Whether the item subject to the environmental tax/charge is privately or publicly supplied is in theory immaterial. The free electricity scheme can still operate with a privatised ESB. In practice, the costs to low-income families of private services tend not to be subvented. In the UK, for example, rules have been drawn up by the water regulator and government on how the water companies should behave towards vulnerable customers, as a result perhaps of bad treatment after privatisation, and there is no subsidy.

Having sketched the options and considered some issues, we can sum up by noting that there are many methods for countering the regressive effects. The compensation options that can comprehensively target incomes that fall below or close to the tax threshold consist of the social welfare system with an extended Family Income Supplement and the tax credit or, better still, the refundable tax credit, currently under discussion. We turn now to check our three examples of market-based instruments to see what could be the appropriate means for compensation in each case.

4.3.1 COMPENSATION FOR THE EFFECTS OF CARBON TAXES (OR AUCTIONED TRADABLE PERMITS)

A system of tradable permits that are not auctioned would be highly regressive without providing government with the means for redressing this result. We will set this example aside (Fitz Gerald *et al.*, 2002).

Auctioned tradable permits, on the other hand, would have price effects that are broadly similar to those arising from a carbon tax. The

overall effects would be similarly dependent on how the revenues are spent.

Use of revenues from carbon taxes or auctioned permits to fund the reduction of other taxes (other than externality taxes) amounts to removing a distortion. With the lower tax rates prevailing at present, the benefits of reducing taxes on labour found in the above-mentioned studies would be less significant, though it could still be worth doing.⁹

The extent and nature of the regressive effects that would result from the introduction of carbon taxes would depend on the recycling option chosen. However, even in the benign scenario, such as that described by Barker and Köhler (1998) where revenue is recycled to reduce employers' social security contributions and social benefits are indexed to wages, the results are weakly regressive. That is, though all expenditure groups are predicted to gain, income disparities rise. If the rise in disparities were to be avoided then intervention would be necessary to counter it.

The results could be made more progressive by means of the social welfare system, which has a regime in place. Fuel allowances, in cash, and the Family Income Supplement would be appropriate means. Alternatively, if refundable tax credits became an option they could be introduced in a tapered way. Many combinations could be considered. It would indeed be possible to recycle all revenue in lump-sum compensation if refundable tax credits became operational. If lump-sum compensation were the only way to make carbon taxes acceptable then the potential benefits of recycling through labour taxes might be dispensed with. The lump-sum compensation could be set at the national average carbon tax per head (per equivalent adult) and paid to everybody by means of the refundable tax credit mechanism. The results would be decidedly progressive.

In addition, certain targeted energy saving measures would be worth adopting. The introduction of carbon taxes may in fact be the catalyst that brings in a programme to upgrade the housing stock as outlined in the *National Climate Change Strategy* and the *Green Paper on Sustainable Energy* (DELG 2000, DPE 1999). A recent study looked at a possible ten-year programme of upgrading the housing stock to the insulation standards of new housing. Using "rigorous and conservative estimating techniques" the societal benefits were valued at three times the costs with a reduction of nearly three million tonnes of annual emissions of CO₂ (Brophy *et al.*, 1999). (As a yardstick, 61 million tonnes of CO₂ equivalent in 2008-2012 is Ireland's limit under the Kyoto Protocol.)

4.3.2 COMPENSATION FOR THE EFFECTS OF CHARGES FOR HOUSEHOLD REFUSE

The 1995 Finance Act introduced an annual income tax relief for individuals who pay service charges. In brief, anyone liable to income tax can claim up to £150 against tax, depending on the types of charges, at the standard rate of tax. This amounts to a flat-rate maximum of £30 to the household and in recent years some £2 million or so of relief has been

⁹ Analysis of the marginal social cost of the different forms of taxation, in the manner of Honohan and Irvine (1987), is needed for determining which taxes are currently the most distorting and therefore the best candidates for replacement by eco-taxes.

allowed to about 80,000 persons, giving an average annual relief of about £27 per claimant.

It is surprisingly difficult to discover what procedures were generally used to help persons dependent on social welfare or whose incomes are too low for them to be able to benefit from the above tax allowance. Some local authorities, such as Dublin Corporation, offer a waiver. Others do not because the service is provided by a private operator. It was not clear what general methods were applied when people under those authorities are unable to pay. Perhaps there is recourse to the Health Boards. With the projected rise in charges it would be important to know how such cases are dealt with from one region to another. The issue is a serious one and needs to be addressed in a satisfactory manner otherwise resentment will be justifiable.

It would be helpful to know how the charges impact generally on household finances, now and in the future. For example, a major source of unfairness has been the absence of charges in some authority areas. It also makes a uniform policy of relief less appropriate. An allowance, in the manner of the smokeless fuel allowance along with the Family Income Supplement granted in selected areas, might suffice. The system of tax credits or, more comprehensively, of refundable tax credits would also be effective.

In the last few years, charges have risen and the authorities could point to the fact that general taxes have simultaneously gone down. Unfortunately, the opportunity was not taken to link the rise in charges to the reduction in taxes, or to present this as a “package” or a replacement along the lines that people said they wanted.

4.3.3 COMPENSATION FOR THE INTRODUCTION OF METERED CHARGES FOR DOMESTIC WATER SERVICES

The final example is metered charges for domestic water services and because this issue has not been described elsewhere this section goes into some detail. Water is special. Along with health care it is probably the most special of items, if such grading is even appropriate. It goes without saying that affordability is a priority. But whether we like it or not, water is an economic commodity. Given environmental realities, the costs of meeting higher standards and growing demand, the need for efficiency is obvious. The way that we pay affects the total we pay and prices should reflect the whole truth.

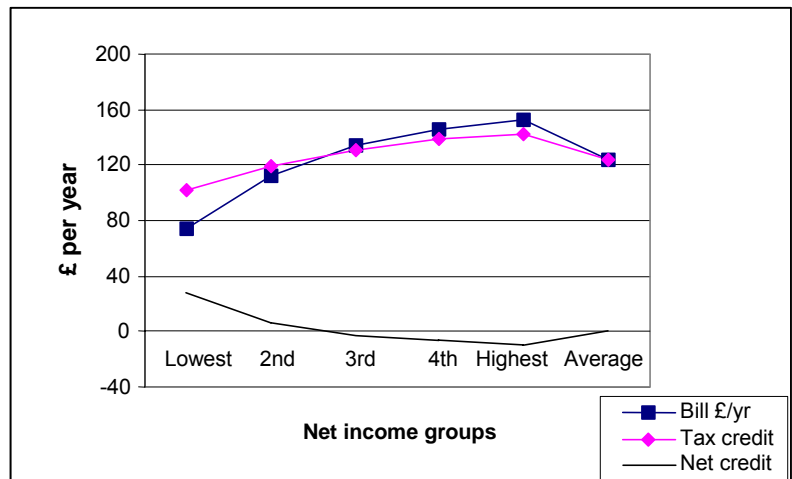
We saw above the regressive results of the introduction of metered water charges. In Figure 4.5 below these are reproduced as the darker line (with squares), called “Bill £/yr”. We noted that a lump-sum amount of money or tax credit returned to each household, corresponding to the value of the average charge, would be very effective in offsetting regressive effects.

It was also noted from Figure 4.3, however, that water use per head is higher when there are few household inhabitants. Pensioners and single parents for example would be inadequately compensated if average water use per head were the yardstick. To be progressive and fair, compensation should relate to average water use per head *relevant to the household size*. Compensation calculated on this basis is shown in Figure 4.5 as the line

called “tax credit”, which starts higher than the line representing the bill paid and then crosses it. Comparing the two lines, households in the lower income quintiles are more than adequately compensated by this method, and those in the higher quintiles are under compensated – a satisfactory outcome. The net effect, the difference between the compensation and the bill is shown as “net credit” at the bottom of the figure. For the average household, shown on the right-hand side, the net credit is consequently zero.

Evidently it would be convenient if a system of refundable tax credits were in operation to facilitate streamlined compensation in the above manner. In addition to the need to set up such a system there is the task of obtaining the numbers of inhabitants in each household. Numbers are required in order to allow the calculation of “credit due” in a way that takes account of higher usage per head in households with few inhabitants, to make the system really fair.

Figure 4.5: Hypothetical Calculation of the Annual Household Bill for Water Services, Tax Credit and Net Change in the Household’s Financial Situation, by Income Group



Note: Magnitudes are based on UK consumption and Irish ownership of water-using devices, and are illustrative only.

4.4 Conclusions

The accepted principles for taxation are efficiency (including environmental efficiency), equity and simplicity (Convery, 1985; Commission on Taxation, 1982). This paper has concentrated on the equity aspect, while firmly holding on to the aims of efficiency and simplicity.

The discussion centred on three examples of economic instruments, namely carbon taxes, charges for refuse and metered charges for water services delivered to the domestic sector, all ideally based on the quantity of pollution. Each of these examples is regressive if introduced on its own without compensating measures. General government would be in pocket

and therefore in a position to respend the revenues. In deciding how to respend, governments have a choice of objectives. On the one hand governments can choose to concentrate respending on reducing distorting taxes. On the other, they can alleviate the regressive effects to such an extent that the result is actually progressive. There is also a range of combinations in between to choose from.

Leaving the choice of objectives aside and concentrating on the distributional aim, we saw that there are numerous options for alleviating regressive effects, and that even the contentious matter of metered water charges could be tackled satisfactorily if we wished. It was pointed out that waivers or reduced environmental charges and taxes would not be the best method if incentives became blurred as a result. The social welfare system's benefits, preferably in cash rather than in kind, are well suited to compensate households that are in the social welfare net. Households that are engaged in low paid work are not so easy to target unless the terms of the Family Income Supplement were extended. The recently introduced system of tax credits brings closer the possibility of awarding lump-sum compensation, which would be a simple and progressive way of redressing the regressive effects. At present however, this option can only benefit those households that are paying tax. Use of the so-called refundable tax credits, currently under discussion, would be worth investigating because they could comprehensively address the gaps in the current social welfare and tax systems.

Above all it is important to implement environmental charges and taxes as a visible "package", which includes reduction of some existing taxes or increases in some receipts. Such an approach would quell the "double taxation" criticism of charges. Further consultation of the public, with the offer of realistic options, would also be worthwhile.

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APPENDIX 4.1

The question on charges in surveys undertaken in 1993 and 2000 was as follows:

"Finally, to meet EU obligations regarding the protection of the environment, it will be necessary to improve our methods of waste disposal and other services. These improvements will have to be paid for, one way or another. This may be through higher taxes such as income tax, VAT etc., or through fixed service charges on households or by charges based on the amount of the service a household or firm uses (for instance, by metering water and charging per gallon used. In relation to each of the following services, how do you feel it should be paid?"

| | Increases in taxes | Fixed Service Charge | Charge for amount used |
|--|---|---|---|
| Supply of drinking water: | <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> |
| Dealing with household garbage through recycling, treatment or disposal: | <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> <input type="checkbox"/> |

APPENDIX 4.2

Table A4.1: Numbers in Household and Ownership of Water-Using Appliances, by Household Net Income Groups (Quintiles)

| | Quintile 1 | Quintile 2 | Quintile 3 | Quintile 4 | Quintile 5 | Average of all households |
|---|------------|------------|------------|------------|------------|---------------------------|
| Number of persons per household | 1.4038 | 2.6266 | 3.3508 | 3.7428 | 3.9578 | 3.0172 |
| Household net income, £/week | 95.31 | 204.13 | 339.10 | 491.13 | 846.65 | 395.29 |
| <i>Ownership or can avail of (% of households):</i> | | | | | | |
| Washing machine | 71.3% | 90.5% | 97.2% | 98.8% | 98.9% | 91.4% |
| Dishwasher | 7.7% | 18.2% | 28.1% | 36.3% | 56.7% | 29.5% |
| Indoor flush toilet | 92.6% | 97.4% | 99.6% | 99.9% | 99.2% | 97.7% |
| Bath or shower (not shared) | 89.4% | 96.2% | 99.5% | 99.9% | 100.0% | 97.0% |

Source: 1998 Living in Ireland Survey, Dublin: The Economic and Social Research Institute.

Note: The question on ownership was phrased: "Do you own or can you avail of...."

Note that the income quintiles are not expressed on the basis of equivalised adults.

Table A4.2: Provisional Quantities and Current Costs of Water Services (Water Supply and Waste Water) in Ireland, Based on Figures of Consumption per Capita from Anglian Water, by Household Net Income Quintiles

| | Quintile 1 | Quintile 2 | Quintile 3 | Quintile 4 | Quintile 5 | Average of all households |
|---|---------------|---------------|---------------|---------------|---------------|---------------------------------|
| Average numbers of persons per household | 1.40 | 2.63 | 3.35 | 3.74 | 3.96 | 3.02 |
| Litres/head/day (provisional estimates) | 139 (162) | 134 (137) | 131 | 131 | 131 (127) | 132 |
| Litres/household/day (provisional estimates) | 196 | 353 | 440 | 490 | 519 | 399 |
| Annual current cost of water plus waste water per household, £ | £73.90 | £112.42 | £133.71 | £145.83 | £153.05 | £123.61 |
| Cost as a proportion of household net income, % | 1.5% | 1.1% | 0.8% | 0.6% | 0.3% | 0.6% |
| Litres/head/day for the above household size for <i>all</i> income groups ¹ | 221 | 145 | 128 | 123 | 121 | 132 |
| Litres/household/day for the above household size for <i>all</i> income groups ¹ | 310 | 381 | 429 | 462 | 478 | 399 |
| Tax credit per household £ | £101.81 | £119.12 | £131.03 | £138.93 | £142.86 | £123.61 |
| Net change per household, £ | £27.1 | £6.70 | -£2.66 | -£6.90 | -£10.20 | £0 |

Notes: Average numbers in household are taken from Table A4.1.

Use (excluding customer losses) by the *average* Irish household, which has 3.02 inhabitants, was derived from the relationship between water use and household size shown in Figure 4.3 for unmetered households, in the sample from Anglian Water. For the *quintiles*, ownership of water-using equipment from Table A4.1 was used in conjunction with ownership/usage/volume tables by Herrington (1996) to derive water use. Bracketed figures are based on Herrington and are “unadjusted” for Irish conditions.

The current cost per household was calculated, first, for the average of all households by dividing total estimated current costs for domestic water and waste water, approximating £122 million in 1998 (Scott *et al*, 2001), by 1.25 million households, and then £26 per household was added for administration. A more correct price would be based on long-run marginal cost (Pearce, 2001). Costs for quintiles were simply calculated pro rata the above litres/household/day, ignoring the potential use of a tariff consisting of several parts. The example is for illustrative purposes only.

¹ Based on the relationship between water use (excluding customer losses) and household size shown in Figure 4.3 for *all* unmetered households (i.e. not quintile specific), in the sample from Anglian Water.

