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Analysis

The implications for households of environmental tax reform (ETR) in Europe ☆

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ABSTRACT

The paper discusses the distributional implications of environmental tax reform (ETR) for households, and presents new results from modelling the impacts of a major ETR for the European Union. The distributional effects arise from the new environmental taxes, any tax reductions made as part of the ETR, the wider macroeconomic impacts from the ETR, any special provisions in the ETR, and the environmental benefits from the ETR. The paper's literature review makes clear that while the impacts from taxes on the household use of energy are very often regressive, transport taxes tend not to be, although the impacts differ between urban and rural households. Moreover, the net distributional impact is often less regressive, or not at all, once the wider distributional effects are taken into account. Residual regressive effects can in principle be removed by further adjustments in the tax or benefits system. The modelling results suggest that an ETR in Europe will actually increase real incomes across the EU as a whole, and will not be generally regressive, although the results differ by country and for different socio-economic groups. The political acceptability of ETR may depend on the worst effects on these groups being mitigated in some way.

1. Introduction

The European Environment Agency has defined environmental tax reform (ETR) as "a reform of the national tax system where there is a shift of the burden of taxes from conventional taxes such as labour to environmentally damaging activities, such as resource use or pollution" (EEA 2005, p.84). ETR is therefore a particular kind of policy instrument, which seeks to apply revenue-raising economic instruments (which may be taxes or auctioned permits in an emissions trading scheme) to resource use and pollution, in order to increase the efficiency of resource use (resource productivity) and improve the environment, and reduce other taxes such that the policy is revenue neutral overall. ETR is therefore a tax *shift*, rather than a tax increase, whereby taxation is shifted from 'goods' such as labour (e.g. income taxes, social security contributions) or capital (e.g. corporation taxes) to 'bads' (pollution, resource depletion). ETR was implemented on a relatively small scale in a number of North European countries in the 1990s and early 2000s, with broadly positive environmental and economic results (Anderson and Ekins 2009).

In the European Commission's Impact Assessment Guidelines (EC, 2009), equity issues such as social inclusion and the protection of particular groups are clearly labelled as impacts that should be considered ahead of any proposed change in policy or regulation. In particular, Table 2 (p. 35) asks the question:

> *Does the option affect specific groups of individuals (for example the most vulnerable, or the most at risk of poverty, children, women, elderly, the disabled, unemployed or ethnic, linguistic and religious minorities, asylum seekers), firms or other organisations or localities more than others?*

The literature review in Section 2 of this paper shows that such considerations are relevant to ETR, because there is substantial evidence that increases in environmental taxes can be regressive, meaning that they fall disproportionately on low-income and rural households, because these groups spend a relatively high proportion of their income on domestic heating. This can affect the political feasibility of an ETR package, so that policy makers considering ETR need to understand the impacts of the package on the distribution of income across individuals and households and, if necessary, implement measures that will reduce or eliminate the regressivity. There is therefore an important research question in this area, which is addressed by this paper: what would be the distributional implications of a major ETR in Europe, and how might any negative distributional outcomes be mitigated?

The research question was addressed by the use of a macro-econometric model to help gain an understanding of the impacts of a broad-based ETR on the distribution of income across individuals and

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households in the European Union, i.e. covering all 27 EU member states (split by income, employment status and location). The modelling uses Cambridge Econometrics 'Energy–Environment–Economy Model of Europe' (E3ME), which is briefly described in an Appendix, and assesses the direct effects and the indirect economic consequences of both the environmental taxes and the recycling of their revenues through a combination of reductions in employers' taxes and income taxes. Section 3 explains the method used to model the impact of ETR on income distribution, followed by a description in Sections 4 and 5 of the baseline case and the scenarios used. Section 6 presents the results from the modelling exercise, and Section 7 concludes.

2. Literature Review

2.1. Introduction

The distributional effects that need to be considered in relation to ETR have various facets:

1) Those due to the environmental taxes themselves.
2) Those due to any tax reductions or revenue distribution associated with the ETR.
3) Those that arise from the broader, economic and environmental impacts of ETR, including price changes of goods and services and macroeconomic effects such as impacts on employment levels.
4) Those due to exemptions and other specific provisions that may have been made in the tax design for various purposes (e.g. competitiveness, social concerns or environmental considerations).
5) The distribution of the environmental improvements brought about by the ETR.

However, for reasons of space the fifth factor is not discussed here.

The review looks at theoretical and empirical findings on the distributional effects of environmental tax reforms, along the lines described above: the distributional effects of the taxes alone, the net effects when including the revenue redistribution side and the wider social and environmental implications. The final section of the review presents conclusions.

2.2. Distributional Effects of Environmentally-Related Taxes

A considerable literature has analysed the distributional effects of environmental taxes in the household sector. Meta-analyses are provided, inter alia, by OECD, 1995, Speck, 1999, Speck et al., 2006, Leipprand et al., 2007, Peter et al., 2007. A broad international discussion is found in Serret and Johnstone (2006).

In general, the direct effects of energy taxes have been found to have regressive implications, in contrast to taxes on labour or income. However, this general statement may need to be modified when taking account of the specific circumstances. A number of studies have demonstrated that regressive effects are the largest in the area of household energy, with the lowest income groups bearing the largest tax burden relative to their income. In contrast, motor fuel taxes tend to put the highest relative burden on middle income groups. This is because the proportion of car ownership is lower in low-income households, and households without cars are not directly affected by motor fuel taxes. The effects are also influenced by country- and region-specific factors, such as overall distribution of income, energy supply structure, energy-efficiency characteristics of domestic fuel use and reliance on car transport.

Leipprand et al. (2007) examined the distributional effects of environmentally-related taxes and charges in five European countries: the Czech Republic, Germany, Spain, Sweden and the United Kingdom (UK) (Fig. 1). The analysis included energy taxes as well as charges on water services and refuse collection.

In the Czech Republic, there is evidence for moderate regressive impacts, which are more pronounced in the UK. In Germany and Spain, the more progressive distribution of motor fuel taxes masks the regressive impacts from some of the other tax instruments. There is almost no evidence for regressive impacts of environmental taxes in Sweden.

In the 1990s, several studies examined the distributional effects of introducing energy or carbon taxes. An early comprehensive study was undertaken by Smith (1992), which concluded that carbon and energy taxes were weakly regressive for most countries, but more strongly regressive for the UK and Ireland. Similar results were found by Symons et al. (1997), who examined the income distributional impacts in Germany, Italy, Spain and the UK. They found that a CO_2 tax as well as an energy tax would be regressive for Germany and the UK, with energy taxes slightly less than CO_2. The impact of the taxes was found to be less regressive in Italy, and even slightly progressive in Spain, an outcome attributed to an increasing proportion spent on petrol throughout the income distribution. In contrast, a later article by the same authors (Symons et al., 2002) found regressive effects for Germany and France, to a lesser extent for Spain, a nearly neutral effect for Italy but a progressive effect for the UK. They explain this unusual finding by the specific expenditure category weights applied in the statistical expenditure data on which the analysis was based — an example of how subtle changes in assumptions and underlying data can influence results to a considerable extent.

Interestingly, by looking at the effects of removing subsidies for energy products in Poland, Freund and Wallich (1997) have shown that middle and high-income households spent, in relative terms, a larger share of their budget on energy products than low-income households. The findings are not transferable to other Member States due to historic (post-socialist) and country-specific conditions, but they show that the negative correlation between household income and the income proportion spent on energy is not always valid.

The distributional impacts of energy taxation have been analysed in particular depth for the UK, which has also been found to be one of the countries where the associated problems are greatest. As mentioned in this section's introduction, household energy and motor fuels merit being studied separately.

Regarding *household energy*, Ekins and Dresner (2004) concluded that a flat carbon tax on the entire population (both rich and poor), without providing compensation for the poorer segment of the population, would be very regressive and increase the already present price burden on the aforementioned poorer segment. Similarly, a study by McNally and Mabey (1999) demonstrated that a tax on domestic energy consumption would be financially regressive for lower income households, as domestic energy is a necessity good. Crawford et al. (1993) estimate that, while the average consumption of all UK households would fall by nearly 6%, energy consumption in the bottom income quintile would fall by 9% on average, while the consumption of the richest quintile would be reduced by only 1% on average. This means that the financial impact as well as the reduction of energy consumption would fall primarily on low-income households.

According to the studies by both Ekins and Dresner (2004) and McNally and Mabey (1999), *motor fuel taxes* are generally considered progressive because they affect the portion of the population who possess cars and not the poorer section who generally do not. However, this is untrue for many of the poorer households in rural areas who travel further, use more fuel, and have less access to public transportation. As a result, McNally and Mabey (1999) have concluded that poor rural households would suffer the most.

A clear disadvantage for inhabitants of rural regions was also found to be associated with environmental taxes in Sweden (Leipprand et al., 2007; Peter et al., 2007; Speck et al., 2006). This outcome resulted from both an academic study simulating the effects of doubling the CO_2 tax (Brännlund and Nordström, 2004), and an ex-post assessment