Environmental Taxation

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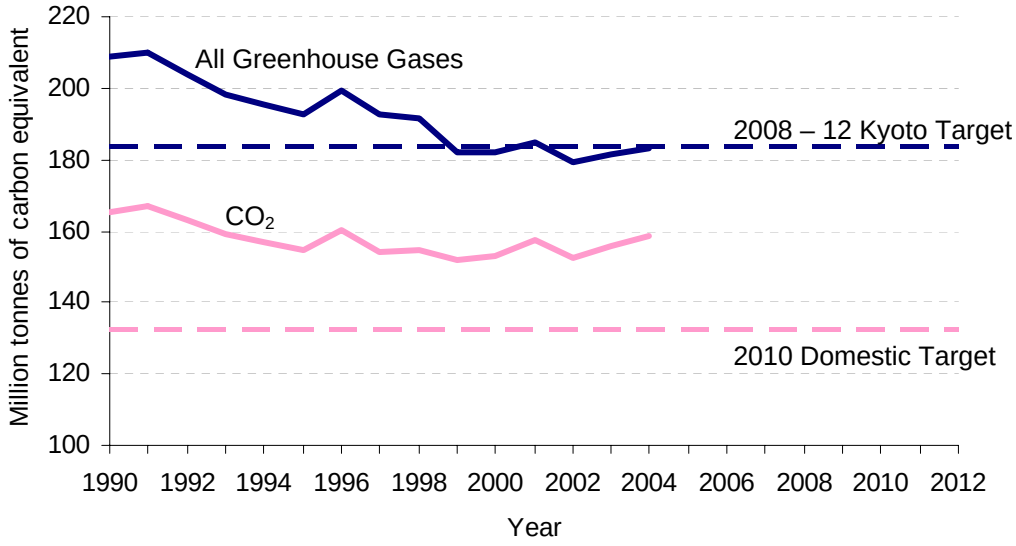
The 1997 Kyoto Protocol commits the UK to reducing its emissions of greenhouse gases by 12½% by 2008 – 2012, relative to 1990 levels. Measured in terms of the carbon these gases contain, this represents a fall from 210 million tonnes in 1990 to around 184 million tonnes. The UK government has also adopted its own target to reduce emissions of carbon dioxide (CO_2, easily the most important greenhouse gas) by 20% compared to 1990 levels – a fall from 165 million tonnes of carbon to 132 million tonnes.

The latest figures from the Department for the Environment, Food and Rural Affairs (DEFRA) show that the UK is set to meet its Kyoto target but not its domestic target. Emissions of CO_2 have remained stuck at around 155 million tonnes of carbon since 1995, and total emissions of greenhouse gases, which fell to their Kyoto target levels as early as 1999, have not changed since (see figure 1). In light of this, all the major political parties have appeared keen to highlight their green credentials. In particular, they have talked about different ways of using the tax system for environmental goals, what is often referred to as 'green taxation'.

Figure 1. UK emissions of CO2 and total greenhouse gases
Source: DEFRA (2005) e-Digest of Environmental Statistics

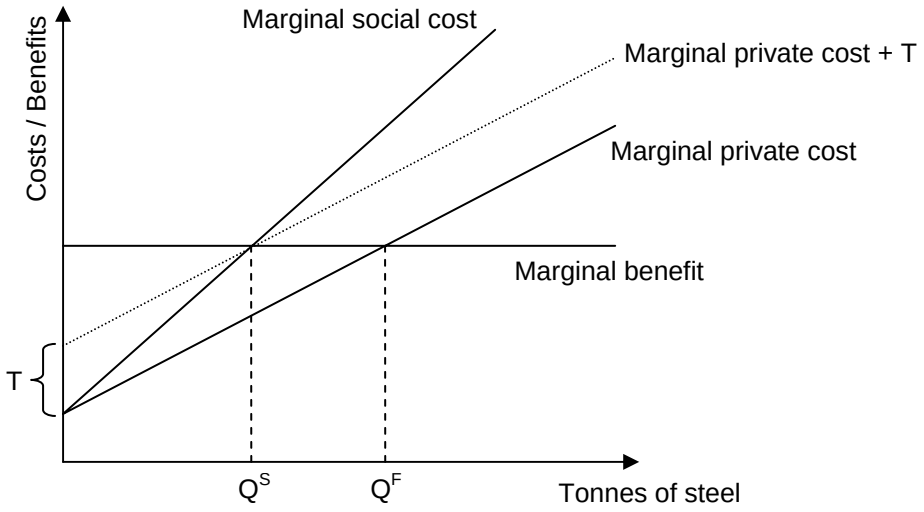


The basic idea behind green taxes is very much like the idea behind taxing alcohol and tobacco. Putting a tax on certain products or services raises their price and discourages people from consuming them. So adding a tax to things which are harmful to the environment will reduce demand for them and so reduce the environmental damage caused. Alternatively, the tax may be imposed on manufacturers because their production processes cause pollution, so the aim is to raise the costs of production and so reduce the amount of pollution generated.

But why should the government have to do this at all? If there is an environmental cost to a particular product or production method then why is it not simply reflected in the price without the need for government intervention? The key problem is that the environmental consequences are examples of *external* costs. External costs, or externalities, are things which people don't take into account when making decisions about what to buy or what to produce because they do not directly affect them. This gives rise to a *market failure* which government intervention can try to rectify.

Let's think about a simple example involving a factory that makes steel. The factory has to decide how much steel to produce. Each tonne of steel brings some extra benefit to the factory because they can sell it for a fixed revenue. So the 'marginal benefit' they get from producing an extra tonne is a fixed amount shown by the horizontal line on figure 2. But each extra tonne produced costs the factory a little bit more than the tonne before, because they have to pay their workers more to work longer hours, and their machinery is used more intensively and so wears out more often. So the 'marginal private cost' of producing an extra tonne increases in the amount produced. The factory will choose to produce Q^F tonnes of steel, where the marginal private cost of the last tonne produced matches the marginal benefit of the last tonne – this will be the choice that maximises the factory's profits.

Figure 2. The externalities argument for environmental taxes



However, in producing steel the factory emits gases into the atmosphere that cause environmental damage. These costs are not directly incurred by the factory – they are external – so they are not taken into account when the decision is made about how much to produce. From society's point of view, however, these costs need to be added to the factory's private cost to determine what the socially desirable level of production is. This is given where the marginal social cost – that is, the private cost plus the environmental cost – equals the marginal benefit to the factory. From society's point of view, it would be better to have a lower level of production, at Q^S, than the factory itself would choose. At production level Q^F, the costs to society of producing steel exceed the benefits so it is an economically inefficient outcome.

How can the government obtain this outcome? If it imposes a tax on each tonne of steel, it will shift up the marginal private cost curve. If it sets a tax of rate T, then the private cost curve will now hit the marginal benefit curve at Q^S, and the firm will choose to produce the socially desirable level of steel. In effect, the tax forces the factory to take account of the environmental cost of its production – we say that the tax *internalises* the externality.

This is obviously a very simplified example and in the real world using environmental taxes can be quite complicated. We might not know what the costs and benefits are and so it won't be obvious what the correct tax rate should be to get a particular outcome. Another factor is that some environmental problems, like greenhouse gas emissions, are global in nature and may require international co-ordination to overcome. This is very difficult to achieve as the protracted negotiations over the Kyoto Treaty demonstrated!

When there are pollution targets to be hit, it might be simpler to just have a policy that forces firms to reduce their level of pollution to a certain level – this is sometimes called a 'command and control' approach to environmental problems. Whilst this guarantees a certain level of pollution or emissions, it may not be economically efficient if the costs of hitting the target exceed the benefits to society of doing so. A tax will be economically efficient but may require some experimentation with the rate to get the level of pollution reduction you desire.

One idea which is getting more and more attention is the use of schemes of *emissions permit trading* which can generate a certain outcome in terms of total emissions at minimum cost. The government allocates or sells a given number of permits to firms involved in the scheme. These permits allow the firms to emit a certain amount of greenhouse gases in a year. Firms that are able to reduce their emissions easily may have more permits than they need, and can sell them to firms that struggle to reduce their emissions. In this way, the total level of emissions is fixed by the total number of permits allocated, and the firms that can reduce their emissions most easily will do so more than those which cannot. By contrast a command and control approach might force each firm to reduce its emissions by the same amount, which is less efficient and more costly. Such schemes have been quite common in the USA, and are now becoming more established in Europe: there is an EU-wide Emissions Trading Scheme (ETS) for carbon dioxide and a UK-based ETS for greenhouse gases.

Another argument often used in favour of environmental taxes is that the revenue they raise can be used to reduce the rates of other taxes, particularly those on labour, which might have economic costs. This is called the "double dividend" argument – not only do you get environmental benefits but also economic benefits. This is controversial, and some economists believe that the circumstances in which you can get a double dividend are actually very unrealistic. Nevertheless it remains a popular argument for the use of green taxation.

But just how much money does the government get from green taxes? For 2004, the latest year for which we have full figures, the Office for National Statistics calculates that £35 billion was raised from environmental taxes in the UK. This sounds like a lot of money, but in fact it makes up only about 8% of all the revenue the government

collected. In fact, the share of total revenue that comes from environmental taxes has been falling in recent years, from a peak of 10% of revenues as recently as 1999.

Although a number of new green taxes have been created over the past few years, almost 80% of total environmental tax revenues comes from just one source – **duty on petrol**. The Government charges a tax of 47.1 pence on each litre of unleaded petrol or diesel bought by motorists. Petrol emits greenhouse gases which contribute to global warming, and petrol duty increases the marginal costs of driving, encouraging motorists to drive less (or to drive more fuel efficient cars) and so reduce emissions.

Other major environmental taxes on transport currently used in the UK include:

- **Vehicle Excise Duty:** a charge that vehicle owners pay each year that varies according to the CO2 emissions rating of the vehicle. The highest-polluting vehicles pay £210 per year, the lowest-polluting only £100, so the tax might encourage people to switch to more environmentally-friendly cars.
- **Air Passenger Duty**: a tax paid by people when they fly. Because aircraft generate greenhouse gas emissions, the tax might reduce the demand for air travel and so reduce aviation emissions. The tax rate is £5 - £40 depending on whether the flight is within the EU and whether you fly economy class or not. Although aviation only accounted for about 0.3% of total UK CO_2 emissions in 2003, some estimates forecast that this could rise substantially in the future without higher taxes.

There are also some taxes that apply to businesses:

- **Climate Change Levy**: a tax on business energy use of 0.43p for each kilowatt-hour of electricity and 0.15p for each kilowatt-hour of gas. There is no tax for energy generated from renewables like wind or wave power, so this could encourage firms to switch supplies to these greener sources.
- **Landfill Tax**: a tax paid when waste is dumped into landfill sites, as this generates methane, a greenhouse gas. Taxing this could encourage recycling or incineration which have lower environmental costs.
- **Aggregates Levy**: a tax on extracting aggregates, which are things like rock, gravel and sand used in construction. Extracting these has environmental costs, so the Aggregates Levy encourages construction firms to re-use materials rather than extracting new ones.

There have been many proposals for how existing taxes should be reformed, or new ones created, to better tackle environmental problems. Greenpeace, for example, would like the highest rate of Vehicle Excise Duty to rise to £1,800 per year to really discourage people from buying the most polluting cars. The Liberal Democrats have suggested that Air Passenger Duty should be charged on each plane rather than on each passenger, since the emissions of a flight don't vary that much whether it is full or half empty. This would encourage airlines to ensure their planes are as full as possible, which would be more environmentally-friendly. The Conservatives have suggested that the Climate Change Levy should be abolished, and replaced with a "Carbon Tax" which would directly tax different fuels according to their carbon content, with the most polluting fuels being taxed more heavily.

Given the domestic target to reduce CO_2 emissions looks unlikely to be met, it might be that even more radical measures could be required. Between 1990 and 2003, CO_2 emissions from industry and commerce fell by 17% and 12% respectively using the Government's own figures. But emissions from the households barely fell at all, and transport emissions actually rose by 8%. These two sectors might have to bear the brunt of any new taxes if significant reductions in emissions are to be made.