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ECONOMIC POLICY INSTRUMENTS

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7.1 What does car-driving really cost?

Each time a vehicle drives a mile it involves a wear and tear of the roads, a certain amount of noise, air pollution and so on. In the language of the economist, public goods or common property resources such as urban space, clean air and so on are used up at no cost. It could be said that transport produces negative external effects, externalities, such as pollution, noise and crowding which are (generally) not compensated for in any way.

According to economic theory, such external effects should be paid for. The logic of the market mechanism is that the market produces an efficient and even optimal outcome, but this hinges crucially on the market working perfectly. If there are market failures, such as external effects or public advantages/disadvantages, then the market mechanism does not allocate resources properly and some form of correcting policy is needed. This does not mean that there should never be any pollution. As soon as we have economic activities there will be pollution. The point is rather that we should maximize welfare (not GDP!) and this requires us to find a good trade-off between material benefits (income) on the one hand and environmental benefits or degradation on the other. It is necessary therefore to formulate policies to compensate for external effects for each sector, namely industry, agriculture, households and transport.

Such a policy instrument can be either a physical regulation such as a maximum emission level or a tax (which is a fee for each unit of emission). Other policy instruments are subsidies (which are quite like taxes) and tradable emission permits (which are a type of regulation for a whole group of polluters who are allowed to trade pollution rights amongst themselves). As a complement to physical and/or tax-based instruments, other measures such as information campaigns are very important.

A particular feature that needs to be considered when discussing transport is that there are very many areas of technology involved in transport (different modes of transport, different types of vehicle, engine and fuel) with very big differences in emission characteristics. The negative external effects are furthermore quite complex (many types of exhaust chemical and other effects such as noise, crowding, accidents, barrier effects and so on). The results of these external effects on health and environment are also extremely space- and time-dependent. The effects of a car driving one mile very slowly in the rush hour close to residential areas or schools, etc. is much worse than one driving at optimal speed in the countryside. Even the weather has considerable significance for the accumulation and transformation of exhaust gases.

This diversity makes policy more difficult since it would be very costly to require all car-owners to achieve the highest environmental standards technically possible. On the other hand, it is environmentally hazardous to continue to allow the really polluting cars to be driven – at least in the rush hour in urban areas!

7.2 The design of policy instruments

A theoretically ideal policy instrument would be a type of road-charge where each vehicle actually had to pay for the marginal damage of each extra mile driven. Such schemes are, however, quite complicated (the charge should vary not only from one vehicle to another but should also depend on where and when it is driven). Since this type of charge is not really available at present (although some interesting schemes are presently being tested in a number of cities around the world) the policy-maker has to rely on a number of simpler policy instruments that are easier to administer.

Transport policy has in most countries relied heavily on regulations, commands and control measures. These include the regulation of traffic flows: traffic-free zones, parking regulations, minimum standards for vehicles, inspection and maintenance schemes, speed limits and so on. Legal structures and the physical enforcement of rules and regulations must always form the basis of any traffic control and transport policy. However, in many situations economic policy instruments can be vastly more efficient than physical regulation. Compare for instance the price mechanism with physical rationing as a way of distributing a certain limited amount of fuel! Currently, vast, but still limited, supplies of oil are allocated between countries and within countries to individual consumers by the market mechanism: when demand in one area increases for a certain product (such as diesel or un-leaded petrol) its price in-

Economic policy instruments in the transport sector

In most countries, a number of different taxes and charges are used in the road transportation sector. These charges may be interpreted as economic policy instruments, even though many of them have been introduced for other purposes, such as raising revenues for the government. The most common ones are the following traditional economic policy instruments:

- Fuel taxes
- Mileage taxes
- Annual vehicle taxes
- Vehicle sales taxes
- Parking fees
- Subsidies for scrapping old cars

It is clear that this traditional set of available policy instruments is not sufficient to be able to differentiate in an optimal way charges with respect to all the aspects mentioned above. As already said, many of the external costs vary dramatically and none of these instruments can alone be expected to guide the development of the transport sector. In various combinations, however, they may function reasonably.

creases and attracts new supplies. To replace this mechanism by a planned rationing system would inevitably be extremely costly and lead both to inefficiency and, presumably, corruption, conflict and other problems.

7.3 Fuel taxes and mileage taxes

Fuel taxation is historically the most important economic policy instrument in many countries. The price and income sensitivities of fuel use have been investigated thoroughly in many studies (see Sterner and Franzén (1995) and Goodwin (1992) for surveys). These surveys show that fuel taxes (and thereby domestic fuel prices) do exert a considerable influence on total fuel demand particularly in the long run. The price fluctuations vary but a long term average of roughly 0.8 per cent is a reasonable amount for industrialized countries (a little but not much less in developing countries). This implies that each percentage increase in petrol price reduces long term fuel demand by 0.8 per cent. A doubling of the price of petrol will in the long run reduce demand by more than 40 per cent.

However, from a socio-economic point of view, fuel taxes are a far from ideal method of dealing with many of the external costs involved. A fuel tax is a perfect policy instrument to deal with the global-warming problem (the greenhouse effect) since fuel consumed is almost exactly proportional to the carbon dioxide emitted.

But some important external effects, such as the wear and tear of roads, noise and congestion are functions of total distance driven rather than total fuel consumed. A tax on fuel-use here implies that people will adjust their behaviour in the long run, primarily through choosing more fuel-efficient cars so that the total distance driven will be affected to a much smaller degree than the fuel-use. In respect of the external effects mentioned, it would therefore be much better if it were possible to tax the distance driven directly instead of indirectly through fuel-use. Furthermore, as mentioned, these external effects differ greatly in time and space, which makes the introduction of a differentiating tax/charge system, instead of a system based only upon fuel price, even more important.

A *distance-related charge* is thus better than a fuel-based system for dealing with many of the external effects. Sweden used to have an odometer-based system for charging trucks per distance driven. The charge differed quite heavily according to axle weight and other variables and thus had a positive effect. This system was, however, abandoned in 1993, on adapting to the European Community rules. As a result, the correspondence between the short-run external marginal effects and the variable charge has decreased drastically. Furthermore, overall taxation on the use of heavy vehicles has also decreased substantially.

7.4 Annual vehicle taxes, and vehicle sales taxes

Most industrialized countries have tax systems which involve annual vehicle taxes (Schipper and Eriksson 1995). They can either be constructed as a flat rate or be related to some representative variables such as weight, displacement or engine power. Such taxes are far from optimal in that they are not related to driving-distance and thus it is unfair that a person who needs his car but uses it infrequently should have to pay the same tax as someone who uses it every day and for long distances. However, in the absence of an advanced road-pricing system, it may still be part of a second-best optimal strategy. It then needs to be related as closely as possible to the expected external effects caused, that is, differentiated with respect to emission characteristics of the vehicle and possibly also with respect to safety features (of both the vehicle and the driver).

A similar tax that is often used is the vehicle sales tax but this is harder to motivate as a policy instrument and should perhaps mainly be seen as a fiscal policy. It might work as a perverse policy instrument as is frequently pointed out by representatives of the car industry. The reason is that new cars generally are much less polluting than old ones and that a high tax on new cars would

increase the average age of the car stock and hence average emissions. On the other hand, it might of course decrease the size of the car stock. In general, it seems to be a very poor policy instrument in order to deal with the external effects of road transport. The only motivation for this type of tax would be if one wanted to influence the long-run characteristics of vehicles by varying the sales tax (heavily) according to key characteristics of cars. There has, for instance, been a system of different environmental classes and correspondingly different taxes in Sweden.

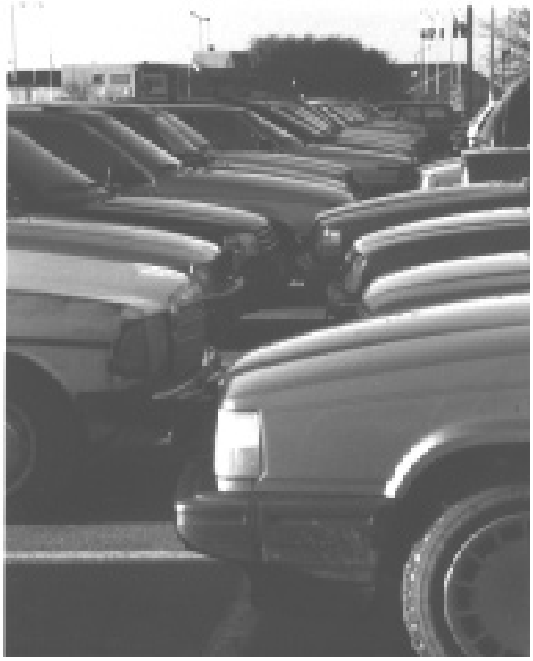
As is well known, old cars pollute considerably more than new ones. This is the motivation behind one particular measure sometimes used: to subsidize the scrapping of old cars so that the average age of the car market is reduced. This may be a politically more acceptable route than simply banning cars with certain characteristics or which fail to meet minimum standards or inspection.

7.5 Parking fees

Parking fees are quite commonly used and may simply be seen as a way of rationing parking space. They are, however, often included as transport policy instruments. As such, they are somewhat perverse since the car actually causes least environmental problems when parked! From an environmental point of view parking, rather than driving around, should be encouraged!

Parking fees do, however, have a large advantage over most traditional policy instruments since they can easily differ from place to place. One may then increase charges where the traffic problems are especially bad. Since a large proportion of traffic is commuting traffic, high parking fees should clearly reduce traffic in a particular area (such as city centres). However, the effect could be the opposite: increased parking fees could drastically reduce long-term parking. This in turn could imply that there would be more parking places available for short-term parking. But short term parking would by itself imply heavier traffic than long-term parking.

Taken to the extreme, assume that some parking places are permanently occupied by long-term parking. Then, clearly, the number of parking places available for commuters would decrease and hence the maximum number of commuters would decrease. However, the availability of free parking space would decrease the amount of traffic searching for a parking place. It is thus impossible to say which effect will dominate. Empirically, there is no clear evidence. In Copenhagen, one has experimented with the fees with substantial consequences for parking behaviour but insignificant effects on the volume of traffic.



7.6 Overall policy

As mentioned in the introduction, one could envisage an advanced road-pricing system as a perfect all-encompassing policy instrument. However, such a system would today be extremely expensive to administer, although technological progress is likely to make advanced road- pricing systems cheaper in a recent future. So, in practice we are today forced to make do with a combination of other measures and instruments, such as emission standards, traffic regulations, and information. The emission standards have improved over time in most countries for the last 20 years, and will probably continue to do so (at least for some time). Physical traffic regulations are also frequently used, although these have not been very successful in dealing with urban traffic problems such as congestion. Information is also very important. In fact there are several types of information needed: scientific information on environmental and health costs (which may vary greatly between different places, as described above); information for the public and particularly drivers to create an understanding of the need for a particular policy, and the need for environmental concern in an area; and also technical information about how pollution may be minimized.

A 'second-best' strategy will typically make use of a combination of policy instruments. This must start with fuel and vehicle taxes since these are the easiest and cheapest to administer. From an environmental point of view it is vital that they differentiate: fuel taxes can differentiate so that cleaner fuels (non-leaded, low-aromatic, low-sulphur, bio-alco-hols etc.) and cars with cleaner exhaust and other environmental characteristics should have a lower tax burden.

Differentiated mileage taxes are an interesting option at a second stage and local charges and regulations of various kinds for particularly polluted areas (larger cities) are an important contribution. Parking fees are not a particularly good instrument in this case although they are again easy to administer and do provide relatively large funds. Requiring motorists who drive or park in the city to buy weekly or other licences of some sort that also give them free access to the local public transport system is an example of the more innovative schemes being tried in some cities.