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Environmental Taxes and Charges and EC Fiscal Harmonisation: Theory and Policy

by Ernst Mohr

CONTENTS

- Command and control instruments (e.g. standards, permits and licenses) have not been very successful in reducing environmental problems in the past. They should be replaced by market-oriented instruments, such as a system of environmental taxes and charges. Such a system would provide incentives to reduce the demand for polluting activities or to substitute other goods for pollution-intensive commodities. Further, it would provide incentives to continually apply the most advanced abatement technology available.
- With international or global environmental problems on the upsurge, there is an increasing role for environmental policy coordination at the Community level. Coordination of environmental policy should in general stop short of a harmonisation of environmental tax and charge rates, as differential tax and charge rates can very frequently be made compatible with the needs of the completed Internal Market 1992.
- In the absence of transboundary spillovers, environmental policy can be completely decentralised if polluting activities can be charged without using integrated control devices. If integrated control devices are unavoidable, only the tax or charge base needs to be harmonised. Tax and charge rates should be fixed by national authorities. Furthermore, if there are no transboundary spillovers and if goods are taxed at the consumption level, only norms for the declaration of polluting components should be set at the Community level. If goods are taxed at the production level, an integrated market requires the harmonisation of tax bases and tax rates at the cost of major environmental distortions.
- If there are international environmental spillovers and if side payments between countries are not feasible, merely international diffusion norms should be set at the Community level. If spillovers are global (e.g. in the case of the ozone hole and climate change), tax or charge bases as well as rates should be harmonised at the Community level.

Contents

1. Introduction	3
2. The Rationale Behind Environmental Taxes and Charges	3
3. Properties of a Market-Oriented System of Environmental Taxes and Charges	5
4. The Completion of the Internal Market: Potential Restriction on an Environmental Tax and Charge System	6
5. Charging Polluting Activities - No International Spillovers, No Need for Integrated Control Devices	7
6. Charging Polluting Activities - No International Spillovers, Use of Integrated Control Devices	8
7. Taxing Products at the Consumption Level - No International Spillovers	9
8. Taxing Products at the Production or Intermediate Level - No International Spillovers	9
9. International Spillovers, Side Payments	10
10. International Spillovers, No Side Payments	11
11. Global Environmental Problems	12
12. Hybrid Problems	12
13. Taxes and Charges Versus Other Market-Oriented Alternatives	13
14. Dynamic Aspects	13
15. Conclusions	14
Appendix	17
References	18

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1. Introduction

Until very recently the almost sole approach to tackling the challenges posed by environmental degradation was the application of instruments from the tool-chest of command and control. However, command and control instruments - permits, standards and licences - have performed poorly. There has therefore arisen the conviction amongst many in the academic and political community that command and control instruments in practice need to be replaced or complemented by a set of different, novel environmental policy instruments. This set has become known under the heading of market-oriented environmental policy instruments.

One of these market-oriented instruments can be found in the form of environmental taxes and charges. Environmental taxes and charges, although proposed for a long time by environmental economists [e.g. Baumol, Oates, 1988; Siebert, 1987] have so far found only very limited application in practice. In the Appendix some examples of proposed environmental tax schemes are given. It is the intention of this paper to investigate the rationale underlying this concept and its scope, and the properties of a practical yet efficient system of environmental taxes and charges in the Internal Market after 1992.

2. The Rationale Behind Environmental Taxes and Charges

The basic principle that governs the allocation of any commodity under market conditions requires those who consume a scarce commodity to pay for its use. Furthermore, the more a scarce commodity is consumed, the larger the purchasing power forsaken. This creates an incentive to economise on the use of a scarce product and thus, implicitly, to take account of the competing interests of other potential users.

Market-oriented environmental policy views the environment as a scarce commodity and applies this basic market principle. The gist of the idea is simply to issue private property rights over the environment and to permit its use, i.e. its

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degradation by the emission of pollutants, only upon the payment of a price. The intention is to thus give an incentive to individual decision makers to economise on the use of the scarce commodity "environment".

The idea behind levying environmental taxes or charges is simply to give these exclusive property rights to a branch of the public sector. The public sector then sells the right to use - i.e. the right to pollute the environment - to interested parties from the private sector. Thus, an environmental tax or charge system is a pricing system on environmental commodities.

Its objective is environmental protection by giving incentives to economic agents either to reduce the overall demand for polluting activities or else to substitute pollution-intensive commodities by other goods [Suhr, 1989].

If properly set, such a system of environmental taxes and charges brings about important advantages compared to a command and control approach. Under the latter, economic agents have no incentive to limit environmental damage to the quantitative or qualitative norms set by a permit or standard. Under the former, economic agents compare the gain in money or utility terms from each marginal environmental damage caused by them with the additional costs brought about by the additional tax or charge payments.

This in turn has important implications. The tax or charge screens environmentally damaging activities, such that decision makers subject thereto avoid those actions where the economic benefit is below the relevant tax rate. However, activities which cause a high economic yield compared to the tax are still undertaken. In contrast, permits or standards do not discriminate between high and low yield activities.

Furthermore, an environmental tax or charge system ensures that environmental damage, caused by economic activities, is unprofitable to avoid under the best available abatement technology. If the abatement of emissions costs less than the associated increase in tax payments, abatement takes place. When a better abatement technology becomes available the tax or charge system ensures that it will be employed. In contrast, under a system of permits and standards an incentive does not exist to abate emissions within the norms set. Furthermore, an incentive does not exist to constantly use the best available technology.

3. Properties of a Market-Oriented System of Environmental Taxes and Charges

The rationale behind market-oriented environmental policy instruments suggests that a system of such taxes and charges has the following basic properties:

- 1) An income or profit tax earmarked to finance environmental policy expenses is apparently not a market-oriented environmental policy instrument. It creates an incentive to avoid income or profit instead of environmental pollution.
- 2) Charges on activities or taxes on products levied to finance the costs of environmental command and control measures also do not belong to the class of market-oriented instruments. As an example take the German "Wasserpfennig". It is a redistributive charge on the use of water. It is levied to compensate farmers for losses due to the legal restrictions of applying fertilisers in certain sensitive areas. The "Wasserpfennig" therefore does not create an incentive to reduce the use of fertilisers below the norm set by environmental command and control.
- 3) From the point of view of environmental policy, the relevant aspect of a charge or a tax is the environmental incidence. Charges on activities or taxes on products containing pollutants are thus environmentally equivalent if the incidence is identical.
- 4) Taxes and charges are unsuitable environmental policy instruments if the prevention of emissions of highly toxic substances (e.g. dioxine) is the objective.
- 5) Products containing pollutants (such as petrol, plastic bags, and electric batteries) should only be taxed if demand is sufficiently elastic with respect to the price.
- 6) The tax or charge should be linked as closely as possible to the pollution that is to be controlled. Consider, for example, the containment of emissions from car driving. A tax on fuel is more effective than a tax on car ownership. A differentiated tax on diesel, leaded and unleaded petrol in proportion to the content of pollutants is still more effective than a tax on fuel in general.
- 7) As pollution is in most cases directly caused by economic activities, the ideal environmental instrument is a charge on the polluting activity itself. This excludes incentive distortions and allows firms or households to exploit all substitution possibilities or abatement technologies available. For example, a tax on the purchase of pesticides is inferior to a charge on the emission of

pesticides as the former does not give an incentive to avoid seepage once the purchase is made.

4. The Completion of the Internal Market: Potential Restriction on an Environmental Tax and Charge System

Environmental taxes and charges have the property of indirect taxes. Indirect taxes, however, are in principle subject to fiscal harmonisation in the EC in the wake of the completion of the Internal Market [Commission, 1987]. Thus the 1992 initiative poses a potential restriction on the design of an environmental tax and charge system in Europe. Environmental taxes and charges will therefore only play a role in the EC if the designers of such a tax and charge system succeed in making the needs of market-oriented environmental policy compatible with the requirements of the Internal Market.

To ensure the functioning of free competition in the Internal Market, the Commission has proposed a harmonised VAT system which would allow member countries to set VAT rates between 14-20 per cent with respect to the normal rate and between 4-9 per cent with respect to the reduced rate. Concerning other excise taxes (cigarettes, tobacco, alcohol and mineral oils), the Commission proposes to introduce the same tax base and the same tax rate EC-wide.

Following this, environmental taxes and charges would have to be levied using the same base and at the same rate in each member country. Country-specific environmental policy using differing taxes and charges would therefore be prohibited.

However, under the subsidiary principle of Article 130r(4) of the EC Treaty, environmental policy is exclusively the task of member countries if environmental policy cannot be achieved more effectively at Community level. Furthermore, Article 130r(2) permits a regional differentiation of environmental conditions. Thus, in principle, member countries can set divergent environmental taxes and charges for the purpose of regionally differentiated environmental conditions [Bongaerts, 1989]. This degree of freedom is in turn restricted by Article 100a, which prohibits national environmental policy to impose arbitrary or hidden trade barriers.

A system of environmental taxes and charges within the EC will therefore have to take into account:

- the restrictions on national environmental policy due to the '92 initiative;

- the restrictions on national environmental policy due to the subsidiary principle;
- theoretical considerations imposed by the effectiveness of market-oriented environmental policy; and
- practical considerations governing the introduction and management of such a system.

Particular environmental problems will have to be distinguished according to:

- the appropriate level of environmental decision making (national, bilateral, or at the EC level); and
- the appropriate degree of environmental tax and charge harmonisation.

A sketch of a conceivable environmental tax and charge system in the EC is given below.

5. Charging Polluting Activities - No International Spillovers, No Need for Integrated Control Devices

There are several factors which influence the optimal tax or charge rate. The abatement technology available, the state of the environment, consumer preferences and consumer income are determinants of the optimal rate. In so far as these determinants differ across countries, environmental tax or charge rates should differ too. Since national differences with respect to these factors do exist within the EC, environmental taxes and charges should in principle not be harmonised.

If the environmental problem at hand is a purely national one (e.g. the pollution of a national water system or local noise pollution), EC authorities possess no particular advantage over national authorities in environmental policy making [Siebert, 1989a]. Under the subsidiary principle, environmental policy then ought to take place at the national level.

National differences concerning the rates and bases of environmental taxes and charges will influence the international competitiveness of firms and goods. However, to conclude that this will set the stage for a harmonisation at the EC level on the basis of the '92 initiative would be premature.

Without international spillovers, the environment has the property of an immobile production factor. The environment as an element of national endowment is therefore a determinant of the fundamental international competitiveness - the very consequences of which are under the auspices of the '92 initiative.

Consequently, charges on national water pollution by paper milling or farming, on local dust pollution from industrial production, on aircraft noise

during landing and take off - and the like - should be allowed to differ across member countries. The structural change in industrial production, farming or air traffic which is caused by these differences is desirable under both environmental policy and Internal Market considerations.

Interestingly, disaggregated environmental policy features a tendency to become more harmonised in a dynamic process [Siebert, 1989a]. Outcompeting other countries or taking advantage of the correct initial comparative advantage increases the domestic environmental damage - by attracting polluting business from abroad. This in turn exerts an upward pressure on charge rates at home and a downward pressure abroad. Initial discrepancies in charge rates therefore tend to exceed the differences in the long run.

6. Charging Polluting Activities - No International Spillovers, Use of Integrated Control Devices

Applying a charge to emissions of pollutants requires control devices which measure emissions. This may cause a market segmentation and give rise to environmental policy harmonisation under the '92 initiative. The problem here is due to the degree of freedom in the choice of the charge base and associated control device.

In the case of aircraft noise, for example, the relevant charge base is decibels. Furthermore, a once-and-for-all inspection of a new engine type suffices in principle to determine the charge for each aircraft using this type of engine. Complicated control devices on board are not needed.

Consider, however, air pollution caused by driving. Potential tax or charge bases are emissions (SO_2 , NO_x), fuels (petrol, diesel), the commodity (cars, trucks) or engine size (4, 6, 8, 12 cylinders).

Although the ideal base is emissions, taxing fuel might be considered more practical. Suppose, for example, Italy decided to tax fuel while West Germany decided to charge emissions on the basis of measurement by a control device installed in the car.

Applying the country-of-origin principle to environmental regulation, Italian cars exported to West Germany would be taxed on the basis of fuel consumption. The country-of-origin principle, however, is impractical, since each member country would then be required to run simultaneously as many charge or tax base rules as the total number of such rules in the EC. The country-of-destination

principle must therefore be applied to tax or charge bases. Italian makes exported to West Germany would then have to be refitted with the control device. This would cause trade distortions.

Different charge bases, requiring different integrated control devices, therefore cause market segmentation. National environmental charge base regulation which requires integrated control devices is comparable to national product standards under the country-of-destination principle.

The requirements of the Internal Market initiative therefore call for a harmonisation of the charge base. Charge rates, however, may continue to differ across countries.

7. Taxing Products at the Consumption Level - No International Spillovers

Although charges on emitting activities are more efficient than taxes on the purchase of products, practical considerations will often make the latter necessary. For example, taxing the purchase of plastic bags at the retail level is easier than charging for plastic components in household rubbish.

Under the absence of international spillovers, the production-factor paradigm applies, and environmental policy is to be set at the national level. Neither differing rates nor differing tax bases cause market segmentation if the country-of-destination principle applies. For example, at the retail level plastic bags, as such or depending on the content of certain polymers, may be taxed.

To facilitate the free movement of goods and the functioning of a disaggregated environmental tax system, there is, however, a role to be played at the EC level. The Community should set norms for the declaration of polluting components in products at the production level, comparable to the declaration norms for products in the US. Taxes levied in the country of destination, based on information provided by this standardised declaration, would then pose no threat to the Internal Market.

8. Taxing Products at the Production or Intermediate Level - No International Spillovers

In many cases, for administrative considerations, taxes are easier to levy at the production level than at the consumption level. This, however, causes various

problems and should be avoided whenever possible.

In principle, just as in the previous cases, from the point of view of environmental policy, the country-of-destination principle should apply with respect to the tax rate. However, this would require a complicated clearing system that would hardly be manageable even for a modest number of different substances under taxation. Therefore, the country-of-origin principle must be applied although pollution occurs in the country of destination.

The country-of-origin principle, however, causes unwanted distortions with respect to both trade and the environment. For one thing, trade is distorted because export prices do not represent the relevant (import country) endowment with the factor "environment". For another, the quantity of pollutants contained in products of the low tax country to be exported to the country with high taxes and a scarce environment will be high.

Hence, when tradeables are taxed at the production or intermediate level, both environmental policy and '92 considerations require a harmonisation of the tax rate. Obviously, in this case a harmonisation of the tax base is also appropriate.

The costs of this procedure, however, arise from the negligence of regional differences in environmental endowments. Furthermore, the proceeds from taxes on exportables remain in the export country, while the import country is left with the environmental damage.

9. International Spillovers, Side Payments

Consider next international spillovers of environmental damage, such as the pollution of the Rhine, with France, West Germany and the Netherlands as the parties involved. In the presence of international spillovers the question of the appropriate degree of centralisation is more complicated.

From welfare theory it is well known that unilateral environmental policy, taking account only of the domestic damage, would lead to an inefficiently low tax or charge rate. Furthermore, arguments from game theory suggest that taxes and charges are set too low even if the environmental policy of neighbouring countries is strategically taken into account. This, however, does not imply that policy coordination should take place at the Community level.

It is possible that bargaining at a bilateral or multilateral level can lead to an efficient environmental policy where countries negotiate bilateral diffusion norms

and individually set the appropriate domestic environmental policy to meet these needs [Kuhl, 1987].

The drawback with international bargaining, however, is that in general an efficient environmental policy is only possible if the pollutee is prepared to make side payments to the polluter to pay for abatement at the source of pollution. Thus, under side payments the polluter-pays principle is replaced by the victim-pays principle.

Side payments carry the stigma of bribes and blackmail and therefore have little chance of surviving in the EC political process.

10. International Spillovers, No Side Payments

If side payments are unfeasible due to political considerations, then bargaining over environmental problems will fail to bring about environmental efficiency [e.g. Mohr, 1990]. Hence, there is a role for environmental policy coordination at the Community level.

Harmonising environmental taxes or charges, however, is not the first-best policy. Again, differences between countries require differing tax or charge rates. When international spillovers are present, country-specific differences with respect to international flows of pollution - net export of emissions or leeway position - further influence the optimal tax or charge rate differentials across countries.

It is to be expected that there are political pressures to harmonise environmental taxes and charges when coordination takes place at the Community level. This pressure should be resisted. It should be borne in mind that the costs of tax harmonisation can exceed the gains from coordination [Feess-Dörr, Maug, undated]. If this is the case, then from a welfare point of view, harmonisation is even worse than a completely uncoordinated, country-specific approach. Put differently, doing nothing about international environmental spillovers may be superior to complete harmonisation.

Fortunately a feasible alternative exists. At the Community level bilateral diffusion norms which have to be observed by each country could be set. This would allow hotspots to be checked. Individual countries would then be free to choose adequate national environmental policy instruments which meet these norms. These would include differential tax and charge rates.

This policy could be carried even further. International spillovers could be made subject to taxation. Under this rule a country would have to pay spillover

taxes to the Community in proportion to its net pollution exports. This would bring market considerations also into the containment of spillovers and could allow a reduction of spillovers below the diffusion norms set in order to prevent hot-spots.

11. Global Environmental Problems

Concerning global environmental problems, a harmonised approach at the Community level is more appropriate. For example, the ozone problem, or perhaps global warming, affects individuals in all member countries very similarly. Losses from harmonisation therefore appear to be minor.

Tackling global problems requires efforts that go beyond the EC. Coordination at the Community level, perhaps in collaboration with the US, could set a signal to other polluters to follow suit.

12. Hybrid Problems

Real world environmental problems quite often feature more than one of the above aspects. A few even feature all of them. Cars, for example, cause local noise problems, international spillovers through air currents and contribute to global warming.

The appropriate approach to tackling hybrid problems with the instrument of environmental taxes or charges is to add the rates that would apply to each individual problem alone. This is because the environment is a public consumption good. For example, because the various services the atmosphere supplies (air to breathe, a temperate ambient, protection from cosmic radiation) all contribute to human well-being, the taxes representing the individual values for these various services need to be added up. Coordination of the different components of the total tax or charge rate are to be set at that level at which each individual rate would be set under the absence of a simultaneous occurrence of other environmental issues.

For example, under a system of taxes and charges intended to cope with several aspects of atmospheric pollution, a harmonised tax rate (set at the Community level to cope with global warming) would merely be a common base rate. It would have to be augmented by rates varying in composition and magnitude, and

set at the bilateral and national level. Thus, once again, the cumulative rates on polluting activities and products would not be harmonised.

13. Taxes and Charges Versus Other Market-Oriented Alternatives

Environmental taxes and charges face potential competition from other market-oriented instruments, from tradeable emission permits in particular. Each of them has its merits and weaknesses [Hansmeyer, Schneider, 1989].

Environmental taxes and charges, for example, are encumbered by the fact that rate adaptations which must be made in response to changes in underlying determinants need be set in a political process. Furthermore, environmental taxes and charges run the danger of gradually becoming a fiscal rather than an environmental instrument [Bonus, 1989].

An optimal system of market-oriented environmental instruments in the EC therefore is neither a system of taxes and charges alone nor only a system of marketable permits. Rather, it contains components from both.

14. Dynamic Aspects

It cannot be expected that a system of environmental taxes and charges will already have attained its final shape upon inauguration in the EC. It is therefore necessary to design the system such that it features the necessary flexibility to cope with changing needs.

Given the trends in environmental development as well as in human perception, it must be expected that taxes and charges will have to be introduced on a larger scale before a technology is available which would permit a levy based on the ideal tax or charge base. Thus taxes on fuel may be introduced initially because control instruments to measure emissions from cars are yet unavailable or too expensive.

However, it is also to be expected that pressure will be exerted on the system to move into the direction of optimality. That is, there will be a tendency to move the tax base downstream, closer to the emitting activity, in order to improve the efficiency of the system. Taxes on products containing polluting substances may therefore initially be taxed at the production level, then at the consumption level, only to be eventually replaced by charges on the emissions

associated with the use of the product. Harmonisation at the Community level, however, may pose a severe obstacle to this process.

A harmonised tax or charge base has some of the same important properties as a technical standard. It has the tendency to fall behind the state of the art. Under EC harmonisation, member countries may therefore face the problem of having to apply an outdated tax or charge base, whereas under a national environmental authority, a more advanced base would be chosen.

A conceivable escape route out of this technical conservatism under tax base harmonisation would be to make a dual system admissible. Under this system each member country would be bound to offer the standard "service" defined by the EC standard tax or charge base. This would prevent market segmentation. Member countries would be allowed, however, to run a second tax base if they were prepared to bear the associated costs.

The country could then leave it up to firms, domestic or foreign, or to consumers to decide on which of the two alternative bases their activities or products were to be taxed. The purpose of course would be to make the alternative package of taxes - based on the more up to date tax base - so attractive that producers or consumers would volunteer to fall under the alternative rule.

To give an example, suppose the EC standard base were to require driving to be taxed on the basis of fuel consumption. A country could offer an alternative to domestic drivers under which driving would be taxed on the basis of pollutants produced. If a car owner decided on the latter he would be exempt from the fuel tax levied at the petrol station. If in fact the alternative system were more efficient from the environmental policy point of view, then it would be appropriate to set the associated charge rate such that an economic incentive existed for drivers to choose the alternative system.

A dual tax base system would also allow institutional competition [Siebert, 1989b] in the EC. This competition would mitigate the tax base conservatism that harmonisation implies.

15. Conclusions

For the main results concerning the appropriate level of environmental tax and charge harmonisation see the Synoptical Table.

In this paper a conceivable system of environmental taxes and charges in the EC has been outlined. This structure is the result of considerations which tried to

account for practical and theoretical requirements as well as for the needs of environmental policy and the 1992 initiative.

There is a role for coordination at the Community level. With environmental problems of an international or a global dimension on the upsurge, this role will become increasingly important. As a rule, environmental policy coordination at the Community level should, however, stop short of a harmonisation of environmental tax and charge rates. The findings suggest that differential tax and charge rates can very frequently be made compatible with the needs of the 1992 initiative. Environmental taxes and charges can therefore become an effective environmental policy instrument in an integrated market.

Synoptical Table

Appropriate policy Environ- mental problem	At individu- al country level, set	At bilateral level, set	At EC level	Action at EC level taken on the basis of	Remarks
Charging for activities, no integrated con- trol devices, no spillovers	charge base, charge rate				
Charging for activities, integrated con- trol devices, no spillovers	charge rate		harmonise charge	1992	allow dual charge base system when- ever base is harmonised
Taxing goods at consumption level, no spillovers	tax base, tax rate		set norms for the dec- laration of pollution components	admini- strative efficiency	
Taxing goods at production or intermedi- ate level, no spillovers			harmonise tax base and tax rate	1992	creates major environmental distortions, avoid when- ever possible
International spillovers with side payments	tax rate	bilateral diffusion norms			victim-pays- principle applies
International spillovers without side payments	tax rate, charge rate		set bilat- eral dif- fusion norms	environ- mental policy	
Global environ- mental problems			harmonise tax/charge rate and base	environ- mental policy	
Hybrid problems			harmonise tax/charge base and rate	1992 environ- mental policy	add tax or charge rates

Appendix

Regulatory Environmental Protection Taxes Proposed by E. U. von Weizsäcker

Proposal	Items taxed	Basis of assessment	Rate	Revenue use	Environmental concern
Energy tax	nuclear and fossil-fuel energy	gigajoules	DM 15	general funds	energy use
Tax for cover-up or sealing off ground surfaces	pavement (all types), buildings, other structures	old version and new version surface area (m ²)	DM 5, rising DM 200	general funds	land/soil resources
Water tax	water pollution, water use	sewage (m ⁿ), water use (m ⁿ)	DM 20, rising DM 5	general funds	water
Waste/refuse tax	waste/refuse	household refuse (tons), industrial waste (tons)	DM 100, rising DM 1000	general funds	waste/refuse disposal
Air tax	air pollution	SO ₂ , NO _x , CO, fluorocarbons methane CO ₂ (tons)	DM 2000, rising DM 200 DM 100	general funds	air quality

Source: Weizsäcker [undated].

Regulatory Environmental Protection Taxes Proposed by the Ministry of the Environment, West Germany

Proposal	Items taxed	Basis of assessment	Rate	Revenue use	Environmental concern
CO ₂ tax	CO ₂ emissions	n.a.	n.a.	earmarked	air quality, climate protection
Disposal tax	special wastes	n.a.	n.a.	n.a.	waste disposal
Conservation tax	land use (surface area)	n.a.	n.a.	n.a.	land/soil resources
Automobile tax	automobile ownership	various emission levels	n.a.	n.a.	air quality

Source: Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, press release, Bonn, 15.8.1986.

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