Intervention of governments and means of pollution control

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L'argomento di questa nota è l'adozione di strumenti correttivi da parte del settore pubblico dovuta al fatto che i costi ambientali imposti a terzi non sono pagati da chi di fatto li genera. Il prezzo che viene pagato dall'utente del servizio di trasporto non riflette il costo sociale, di qui l'intervento del settore pubblico avente come obiettivo la correzione o l'eliminazione delle esternalità provenienti dal settore dei trasporti. La soluzione alle esternalità suggerita da Pigou prevede l'imposizione di un'imposta al soggetto inquinante al fine di imputare correttamente i costi considerati come espressione dei prezzi d'uso delle risorse naturali. Il principio "inquinatore-pagatore" dovrebbe dunque essere applicato al settore dei trasporti al fine di ristabilire l'efficienza economica attraverso l'internalizzazione dei costi ambientali.

Introduction

Economists consider environmental pollution as an economic problem and it is the result of a market failure. This term is used broadly to cover both situations where a market, and hence a market price, does not exist and where the price is a defective index of value. In the context of environmental economics the most important source of market failure is the divergence between the producer's evaluation of the costs of his activities and the evaluation by society as a whole. This divergence typically arises because of the presence of what are called "external effects" and "third-party effects".

With regard to private markets, they can provide inadequate environmental protection when environmental values are externalities inadequately reflected in the prices consumers pay for goods and services or, when environmental values are public goods, all individuals benefit but no single individual has an adequate incentive to invest.

In order to correct the market failure economists would require private decision makers to internalise the externalities through governmental intervention. The efficiency argument for public intervention to reduce pollution or ameliorate its damage is well established in theoretical literature. Pollution is an example of a negative external effect and it imposes harmful effects and costs on people other than the polluters. The free market does not motivate the polluters to reduce damage since the costs are largely paid by others. The market, if it is left to itself, is consequently not the most effective mechanism for keeping pollution at reasonable levels.

Instruments of control

The leading instruments of control to be considered are:

1) regulations;
2) subsidies;
3) taxation.

Regulations, in the sense of "command and control" by governments, rely on uniform, inflexible, technology-based standards coupled with monitoring and sanctions. In this case the polluter has an incentive to comply with regulations otherwise sanctions are imposed for non-compliance. This type of regulatory system has been severely criticised by many experts for being cost-ineffective, inflexible and for discouraging innovation and investment.

Another form of governmental intervention is represented by subsidies. They are widespread in transport and are often justified as an instrument by which to encourage the use of more environmentally friendly public transport modes.

As for taxation, this is another indirect tool that can be used to reduce pollution. If a polluter's emissions can be fully determined by the consumption of one good then the good, according to marginal external costs, is equivalent to an emission tax. Indirect pollution taxes applied to fuels, such as carbon taxes, are an example. In fact the external effects are independent of both source location and combustion process. But if a pollution good cannot be fully taxed then a related good should be taxed if it is a complement to the polluting good and subsidised if it is a substitute good. For example if we suppose that private vehicle use in urban areas is polluting but it cannot be taxed sufficiently, or only at a prohibitive cost, then a "clean" substitute, such as a subway, should be subsidised but a "clean" complement, such as central parking facilities, should be taxed.

Nevertheless taxation of complements and subsidisation of substitutes are efficient under fairly general assumptions, but counterintuitive results can take place because they depend on own-price and cross-price elasticities of demand. These happen when indirect instruments have involuntary distortions. In the example mentioned above if public transport and central parking facilities are sufficiently strong substitutes for each other, subsiding subways and taxing parking spaces can have the

final effect of an overutilization of subways. When this happen then parking space should not be taxed so much and it could even be subsidised.
Another example that can be analysed is gasoline use which has negative external effects in terms of congestion and pollution when it is used in cities, but it is also "innocent" when it is used for countryside driving. In this case a commodity tax, linked to externality, can cause a distortion with regard to the "innocent" use so that the problem arises of the necessity to use an additional instrument on a related good that can reduce the costs of the mentioned distortion.
According to Sandmo a related good should be taxed if it is a complement to the polluting activity and a substitute for the "innocent" activity. On the other hand a related good should be subsidised if it is a complement to the "innocent" activity and a substitute for the polluting activity. With regard to our example it should be possible to supplement gasoline taxes with taxes on central parking and central road use and to subsidise parking at peripheral metrorail and bus stations.
But when the tax on the polluting good internalises the externality there is no need to tax complements or to subsidise substitutes.
It is clear, therefore, that in this context since there are, generally, two conflicting interest groups in an externality, the polluter and the pollutee, we need a notion of an optimum level of externality. This is defined as the level at which the marginal "dis-benefit" to one party from alterations in the level of the external effects are equal to the marginal benefit to the other party. These marginal evaluations are indications of "willingness-to-pay" (W.T.P.). In this case a Pigouvian tax might be applied and this is an instrument by which governments, using a pollution tax to protect environmental quality, should select a base and a rate so that the external cost of activity is internalised. The base for tax should be the damage caused or a close proxy for damage, such as the volume of emissions (an example might be the carbon tax) and the rate of the tax, following a general rule, is one equivalent to marginal cost of production plus the incremental value of the externalities.
It might be stated that the support of W.T.P. evaluations of the environment is coupled with a preference for market solutions. Market instruments are preferable to the use of physical controls provided that the costs of monitoring and of setting the tax level do not outweigh these efficiency gains and that the consequences for the distribution of welfare among the population are not judged unacceptable and cannot be correct except at excessive costs.
Obviously there are a lot of situation in which these conditions are satisfied: one of these is the carbon tax to control carbon dioxide emissions. It is a tax on fossil fuels in proportion to the amount of atmospheric carbon dioxide that is released when they are burned. It is different in comparison with other broad-based energy tax proposal, such as President Clinton's proposal for the BTU tax, in the relative burdens that it places on coal, oil and natural gas. Because externalities are associated with end-products of combustion, not with energy use "per se", there is a strong rationale for basing Pigouvian taxes on emissions rather than other fuel characteristics such as BTU content. In addition since carbon taxes are Pigouvian taxes, at the optimal tax rate the present value of the marginal output losses associated with the tax would precisely equal the present value of marginal gains from reducing greenhouse gas emissions. Even if the taxes are not set optimally, if there is a social value in reducing greenhouse gas emissions, the foregone output associated with a carbon tax overstates the net social cost of these policies.

Conclusions

The failure of the market, that is the incapacity of the market to be the "mirror" of the value of the resources, and the "new" consciousness regarding the need to incorporate environmental factors in macroeconomic and microeconomic models have allowed economists to make a through study of these subjects at a theoretical level. Pigou showed the solution to the externalities by imposing a tax on the polluter in order to attribute to him the cost of the "use-price" of natural resources. This principle has come under criticism because of the impossibility of properly using the taxation method when there is not a perfect competition and because others prefer the principle whereby the polluter has to pay an indemnity to the damaged subject. But other economists showed the theoretical and practical validity of the taxation method. In fact, according to Solow, taxation is a cheap instrument for Public Authority, it requires a limited quantity of information and it is easily administered. On the contrary, the limited theoretical validity of the environmental standards method has become evident especially with regard to the fact that there is no possibility of achieving an "optimal point". In particular the fixation of the qualitative standard is very expensive in the decisional stage because it is necessary to set several standards and indicators for all the polluter subjects. Furthermore, this method implicates the determination "a priori" of the maximum quantity of pollution in accordance with the affected environment. This criterion is really "anti-economic" because it is not based on the strategy of minimisation of costs by each polluter. Hence, probably, the best solution to the pollution problem is the one based on the "polluter-payer" principle, that is the polluter has to pay for the interventions mentioned above, decided by the Public Authority, in order to have an acceptable environment. In other words, the costs of these interventions have to be transferred to the costs of goods and services, the consumption of which are source of pollution.

References

Abelson, P. (1979), Cost and benefit analysis and environmental problems, Saxson House, Southampton.

Barde, J.P.-Button, K. (eds.) (1990), Transport Policy and the Environment. Six Case Studies, Earthscan London.

Barrass, R.-Madhavan, S. (1996), European Economic Integration and Sustainable Development, McGraw-Hill, London.

Baumol, W. (1972), "On Taxation and the Control of Externalities", American Economic Review, June.

Bowers, J. (1993), "A Conspectus on Valuing the Environment", Journal of Environmental Planning and Management, no.1.

Button, K.J. (1990), "Environmental externalities and transport policy", Oxford Review of Economic Policy, no. 2.

Crawford, I.-Smith, S. (1995), "Fiscal Instruments for air pollution abatement on road transport", Journal of Transport Economics and Policy, no. 1.

Eskeland, G.-Jimenez, E. (1991), "Policy instruments for pollution control in developing countries", The World Bank Research Observer, no. 7.

Markham, J. (1988), "Transport and the environment: equal competition means the polluter must pay", Istituto Internazionale delle Comunicazioni, Genova.

Pearce, D. (1991), "The role of carbon taxes in adjusting to global warming", Economic Journal.

Sandmo, A., (1975), "Optimal Taxation in the Presence of Externalities", Scandinavian Journal of Economics, no 77.

Sandmo, A. (1976), "Direct versus Indirect Pigouvian Taxation", European Economic Review, no. 7.

Smith, P., (1992), "Controlling traffic congestion by regulating car ownership. Singapore's recent experience", Journal of Transport Economics and Policy, January.

Wijkander, H. (1985), "Correcting Externalities through Taxes on Subsidies to Related Goods", Journal of Public Economics, no. 28.