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Commentary on Fullerton, Leicester, Smith, 'Environmental Taxes'

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Efficient Taxation for Environmental Improvement.

A comment on "Environmental taxes" by Don Fullerton, Andrew Leicester and Stephen Smith.

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Taxes on activities that are harmful to the environment are different from other taxes in one very fundamental respect. Whereas most taxes lead to a less efficient allocation of resources, environmental or Pigouvian[1] taxes have the potential to make the market mechanism work *more* efficiently than would be the case in their absence. Given the environmental problems that we are currently faced with, modern discussions of tax reform therefore have to take account of Pigouvian taxes. Environmental problems move up on the list of research priorities for public finance economists at the same time as they move up on society's agenda for public policy. I will not try to sort out cause and effect here. But it is interesting to note that in 1959, when environmental issues received very little thought and attention, neither from economists nor from policy makers, Musgrave's famous treatise used only a brief paragraph to discuss Pigouvian taxes, and this, curiously, came at the end of a chapter entitled "The ability-to-pay approach" (Musgrave 1959, pp. 114-115). There can be no doubt that the extensive work that has been carried out in this area of public finance has increased both our awareness of the importance of the environmental problems that confront us as well as our theoretical understanding of the basic issues that arise in the design of policy.

This interesting and informative survey of the principles and practice of environmental taxation covers a lot of ground as regards both theory and applications. The following commentary is mostly concerned with theoretical principles. My comments take the form partly of further elaboration and interpretation of the arguments advanced by the authors, partly of points that I feel are in need of greater attention.

Principles of policy design.

[1] Named after the great Cambridge economist Arthur C. Pigou, who was the first to discuss them in his 1920 book *The Economics of Welfare*.

The authors do an excellent job of explaining the case for taxes as instruments of environmental policy, and their exposition should appeal both to economists and to a broader audience. I can actually claim some experience in communicating the economists' way of thinking to the general public, for I published my first article on environmental taxes (in Norwegian) in 1971, and this generated a good deal of discussion. There was, it turned out, much resistance to the idea, particularly from the business community. Some of the arguments advanced against green taxes were such that I first decided that they completely missed the point, while I later came to the conclusion that there was much to learn from them. A good example of this was the objection that this proposal was simply one more attempt by economists to invent new sources of revenue for public sector expansion[2]. This was of course not true - I had thought that it could be taken as understood that the size of the public sector should be treated as a separate issue - but I learnt something about the importance of making one's assumptions clear. Other sources of misunderstanding were related to basic economic concepts such as social efficiency and economic incentives. It is my definite impression that the public understanding of these issues has increased considerably during the time which has passed since then, and that it is easier to gain acceptance for the idea that the design of tax incentives is a fruitful approach to environmental policy.

In the literature on this topic a distinction is commonly drawn between so-called command-and-control policies and policies that utilize private incentives. Taxes are the prime example of the latter, but it is important to be aware, as the authors point out, that tradable quotas share many of the properties of the tax solution. Trading quotas in a competitive market will establish a quota price which has the same properties as the Pigouvian tax. If the government sells quotas to the polluters, the two cases will be virtually identical both as environmental policies and as sources of government revenue. This equivalence should be kept in mind both in reading the paper itself and the present commentary, but like the authors I limit my discussion to taxes, leaving the implications for tradable quotas to the reader.

The authors' list of the advantages of taxes is a comprehensive one and also contains at least one point which is usually neglected in the literature, viz. the importance of translating firm level incentives into incentives directed towards individual performance; especially for large companies, this point may be of considerable importance and should receive greater attention in the literature. But one of the most general insights that emerges very clearly from the discussion is the importance of the assumption - one that is otherwise usually only made

[2] Another reason for the resistance to taxes and the more favourable attitude towards quotas might be that quotas are likely to prevent entry and favour existing firms, a point also made by the present authors.

implicitly - that the individuals and firms who respond to environmental policy are what one might call “tax takers” or, more generally, “policy takers”.

This may be in need of some elaboration. The point of reference for theoretical discussions of environmental policy is typically the general equilibrium model of the competitive economy, where firms and consumers are “price takers”, meaning that no single agent acting on his own has the power to influence market prices. The analysis of taxes in terms of tax-inclusive prices is also based on the competitive assumption. Agents, being small in relation to the size of the market, take tax rates as beyond their control for exactly the same reason that they take prices as given. This assumption becomes a bit more troublesome when it comes to policy instruments like quotas, for quotas have to be specific for each agent or firm, and in that case it may be profitable for the agent to try to influence the size of the quota by lobbying or even corruption. This would seem to be especially likely when the private agent is a large one who could threaten the government with cutting back on employment or moving its operations abroad unless his emission quota is increased. What is true for quotas would in fact be equally true for taxes in cases where the tax base involves only one or a few agents. This could be the case where the government attempts to achieve a very specific environmental objective, such as the extent of pollution in a particular local community. There is accordingly a trade-off between the degree of targeting of the policy instruments and the extent to which one can rely on the agents to take the policy instruments as fixed by the government, which is the way that we usually model individual behaviour in a mixed economy. The use of Pigouvian taxes to control pollution can, as the authors point out, lead to a cost-efficient reduction of pollution, but this conclusion is crucially dependent on the assumption that agents take tax rates as given. It is because each agent faces the same tax rate on emissions (or factor use or output) that the marginal cost of reducing pollution ends up as being the same for all polluters.

From this point of view I am inclined to put a small question mark in the margin when, in Section 2.3, the authors discuss an excise tax on inputs into a polluting production process. The background for their discussion is the point that the amount of emission is the ideal tax base, but on the other hand it may be difficult and costly to measure. In order to overcome this problem they consider as a substitute a tax on inputs (e.g. a tax on fuel use instead of a tax on smoke emission) and conclude that “with few producers, this tax will be comparatively cheap to operate.” If such a tax generates a significant amount of revenue and becomes an important element of cost for the few producers concerned, the likelihood seems high that the producers might join their lobbying efforts against the government in an attempt to bring the tax rate down. If that were to happen, the producers would not be “tax takers”, and

haggling over the tax rate could be a costly process. Perhaps future research in environmental economics should devote more attention to this type of situation by investigating the efficiency properties of cases where policy is at least partially determined as a result of a bargaining process between the government and the polluters.

Another aspect of the need to compromise with the principle of targeting emerges in the general discussion of what should be taxed: emissions, input or output volume. The basic principle is that to achieve efficiency the tax should be levied as close as possible to the source of pollution, and this normally calls for taxing emissions. However, as the authors point out, a difficulty about a tax on emissions is that it is not based on a market transaction. The tax collector would then have to establish a relationship with each individual polluter, thereby increasing the role of individual negotiation. Moving from taxes on emissions to taxes on inputs weakens the degree of targeting of the tax system but establishes more of an arms-length relationship between the polluter and the tax collector. Moving further to taxes on output would in general imply even weaker targeting, but could possibly be justified by the gains from "tax taking" behaviour[3].

The attempts by individual agents to influence statutory tax rates or quotas should be clearly distinguished from the case where rates or quotas are in fact taken as given but where agents engage in evasion activities by underreporting emissions (or whatever quantity it is that defines the tax base or the quota). The following and somewhat surprising result has been demonstrated in the theoretical literature (e.g. Sandmo 2002): Even if the polluting firm exploits the opportunity to evade the environmental tax by underreporting emissions, it may still equate the marginal cost of reducing pollution to the tax rate; if all polluters do this, the outcome that emerges is one where the pollution that actually occurs is indeed efficiently allocated among the polluters. However, the underreporting of emissions (or the exaggerated reports of emission reductions) may lead the government to believe that the tax achieves more in the form of pollution reduction than what it really does. This may in turn lead the government to set environmental taxes at inefficiently low levels.

The double dividend.

A large number of articles have been written on the subject of the double dividend. The volume and complexity of the literature can to some degree be explained by the numerous different interpretations and definitions of what the double dividend really is. However, the

[3] The authors note this point in their discussion of geographically varying damage in Section 2.2, but it seems to me that the point is of much more general validity.

basic intuition is as follows: Pigouvian taxes improve the environment; in addition, they raise revenue. Since they do so, the replacement of ordinary distortionary taxes by green taxes must lead to a reduction of the efficiency cost of raising revenue. Therefore, a tax reform that replaces ordinary by green taxes in the context of constant overall tax revenue must imply a social gain from more efficient revenue-raising in addition to the gain from an improved environment. This is the essence of the double dividend argument.

At this level of generality the proposition that a double dividend exists may seem obvious. However, when one tries to make the proposition more precise, things get rather more complicated. I am in basic agreement with what the authors say about this issue, but let me restate some of their points in a slightly different way.

The theory of optimum taxation is in a way a natural framework to use for an analysis of this issue; after all, the argument is concerned about the efficiency properties of alternative tax systems. On the other hand, it does not make sense to start from a situation where the overall tax system has in fact been optimized. In that case, the government has already achieved an optimal balance between the revenue from distortionary taxes and the environmental gains from green taxes (as shown in Sandmo 1975). In such a situation a small change in the balance of taxes would not yield any dividend at all, and a large change could only lead to a decline in social welfare. A more realistic analysis must therefore take the perspective of the tax reform literature. In that type of analysis there is no presumption that the tax system is optimal at the point of time of the reform. Instead, one takes as a starting point a state of the tax system the corresponds to the actual situation and then studies the welfare effects of a balanced budget reform that is believed to lead us in the right direction in terms of environmental improvement..

This makes it crucial to specify the initial situation from which the reform starts. A natural case is one where the seriousness of environmental problems increases and Pigouvian taxes - to the extent that they exist at all - are perceived to be too low. It is therefore decided to raise them, and since this generates revenue for the government, the increase must be balanced by a lowering of other taxes[4]. Let us take it for granted that the Pigouvian tax does succeed in reducing environmental pollution. Is there an additional welfare effect via a more efficient system for raising tax revenue? The answer in principle is yes, in the sense than one can distinguish between two separate effects of the reform, one that is related to the environmental benefit and one which concerns the efficiency with which revenue is raised

[4] I am assuming that we are not so far from the optimum tax system that tax rates are on the downward-sloping side of their individual Laffer curves; in that case a lower tax rate would increase revenue.

(see Sandmo 2000, chapter 6). On the other hand, starting from some arbitrary initial situation, there is actually no guarantee that the latter effect will be positive, since the introduction of Pigouvian taxes might have as a result that pre-existing distortions become magnified via cross price effects on demand and supply. (An example would be the case where the goods or services that are subject to Pigouvian taxes are complementary with labour, so that the distortions of labour supply that are due to income and payroll taxes are exacerbated by the green taxes.) This argument supports the authors' conclusion: To evaluate double dividend arguments one must be precise both about the policies that are actually in place and about the exact nature of the tax reform.

One version of the double dividend argument that the authors do not mention, but which has in fact received a good deal of attention, is that the second dividend might be a reduction of unemployment (see e.g. Koskela, Schöb and Sinn 1998, or Bovenberg and van der Ploeg 1996). My impression is that this version of the double dividend hypothesis has a stronger appeal to political decision makers: In countries where unemployment is high, this secondary effect of green taxes is much easier to understand and promises to solve a problem of greater urgency than the efficiency loss from distortionary taxes. The reasoning that underlies this particular theory of the double dividend is as follows: If an increase of environmental taxes is accompanied by a reduction of the payroll tax, this will result in a lowering of labour cost to firms and therefore increase their demand for workers. Thus, employment will increase and unemployment will fall. In this case also, the short version of the argument is more convincing than the longer and more elaborate. To explain the existence of unemployment, we have to move away from the assumption of perfectly competitive markets, and the alternative which has been most common in the literature is some version of a model where the wage rate is set by a trade union with firms deciding the amount of employment (as in Oswald 1985). We then have to consider the incidence of the payroll tax: Will a reduced rate lead to a corresponding fall in labour cost, or does the trade union capture some of the gain from the lower rate in the form of higher gross wages? The most likely outcome appears to be that the cut in the payroll tax will lead to some increase of the wage, although not by so much as to undo the direct effect of the lower tax rate. But we also have to take account of the incidence of environmental taxes on the wage claims of the union. If a green tax reform consists of a lower payroll tax in combination with increasing taxes on car use and household energy, it seems likely that the price increases, by increasing the general cost of living, would release claims for wage compensation in a unionised economy. Altogether, it seems likely that the net effect of a green tax reform on labour cost might be considerably less than the immediate effect of a cut in payroll taxes. But there is a variety of models that may be applied to the study of this problem, and the

theoretical analyses do not lead to clear-cut hypotheses. In any case, this version of the double dividend theory seems important enough to be mentioned in the present context.

On the whole, I agree with the authors that the main case for green taxes must be their environmental benefits, not their second dividend (however defined). One may wonder why the double dividend argument became so prominent in the policy debate. Of course it raises some interesting analytical problems which are attractive to public finance economists. But one also suspects that the attention given to the double dividend comes from a desire to convince politicians about the merits of green taxes by arguments that economists believe to have a greater appeal to them than the concern for the environment. As a strategy of persuasion this has some risky elements in it, since it makes the case for Pigouvian taxes depend on unstable or uncertain matters like the rate of unemployment and the magnitude of tax effects on labour supply. It would be very unfortunate if e.g. a drop in the unemployment rate were perceived as weakening the case for Pigouvian taxes. The case for environmental policy ultimately rests on much more solid foundations.

Intrinsic and extrinsic incentives.

The authors allude briefly to the argument that environmental taxes might affect not only the taxpayer's budget constraints but also their attitudes, either by legitimizing behaviour which is detrimental to the environment or by weakening or "crowding out" intrinsic incentives to environmental-friendly behaviour[5]. In the first case, the argument is that pollution activities may become easier to reconcile with one's social conscience if one is actually being charged for them; in the second case one's incentives to keep the environment clean are weakened by the knowledge that the government is taking charge. I believe that this is an argument that needs to be taken seriously, if only because the neglect of intrinsic incentives is often used as a criticism against the economic approach to environmental problems. Let me briefly consider the crowding out argument. What difference does it make to the standard approach? The assumption is that the individual polluter has an attitude reflecting social responsibility and suffers some individual loss from his own pollution; this makes him pollute less than he "otherwise" would. The imposition of a tax on pollution lowers the polluter's subjective "conscience tax", so that the net effect on pollution is less than would be the case with purely self-interested individuals or firms. However, this hypothesis is very hard to test directly. Economists are more interested in elasticities: How does the polluter react to an increased tax on pollution? The exact nature of the preferences underlying the elasticity may,

[5] For a general analysis of intrinsic and extrinsic incentives see Bénabou and Tirole (2006).

at least for the purpose of descriptive analysis, be of little interest. We are mainly interested in the polluter's reaction to tax incentives, not in the exact nature of the preferences that determine his or her behaviour.

However, this conclusion may be interpreted from a somewhat different angle. The economic emphasis on the need to utilize private economic incentives need not rest on a very narrow view of human motivation. It is perfectly possible to construct models where agents care about the state of the environment and about the effects of their own behaviour, but where taxes and other policy instruments still have the potential to change behaviour in desired directions. The reason that we as economists often neglect these more complicated models is that we frequently are able to state our points with simple models. But we should perhaps realize that this kind of simplicity is likely to make us appear unnecessarily narrow-minded to people outside of the economics profession.

Although the arguments about intrinsic incentives should be taken seriously, they are unlikely to lead to dramatic changes of the standard policy recommendations in this area. If e.g. one carries the view of taxes as legitimizing pollution to extremes, one might be led to the conclusion that taxation is likely to encourage environmental pollution because elasticities actually have the "wrong" sign: Taxes on car use would lead to more driving, and taxes on household energy would make consumers turn up their room temperature and leave the lights on. But hypotheses like these are so out of touch with empirical evidence that they need hardly be taken seriously.

The importance of elasticities.

The effects of environmental taxes clearly depend on the magnitude of the relevant elasticities. If the base of a green tax is very price inelastic, the effect on the environment will be very small, and Pigouvian tax enthusiasts will have to face the criticism that this is just another way to raise revenue. Perhaps we ought in general to be more explicit about the time frame that we have in mind when we analyze green tax effects on behaviour. Taxes on cars and car use may be a case in point. In the short run, the effects of taxes on cars and petrol may be small, given the existing stock of cars. But in the somewhat longer run this may change as a result of altered tax incentives. Households may decide not to replace their second car or modify their habits as regards travelling to work. In the even longer run, increased taxes on transportation may reverse the trend in city development that has been so characteristic of the post-war period. Instead of the continuation of urban sprawl, we may come to see a movement towards more compact cities with greater reliance on collective

transportation. The classic insight that elasticities are higher in the long run than the short is of crucial importance for environmental policy.

The magnitude of the price elasticities are also likely to depend on other elements of public policy. According to Leape (2006), the success of the London congestion charge in reducing traffic in the central areas of the city was to a large extent due to the presence of a substitute for car use in the form of a well-developed system of public transport. The availability of this substitute was probably also the main reason why the congestion charge could be introduced with only minor effects on local business. Thus, the design of environmental tax policy should be seen in conjunction with that of publicly provided goods and services.

International aspects of the carbon tax.

Some environmental externalities are global in nature, in particular those that are related to global warming and climate change. These pose particular challenges for environmental policy. Relative to the scale of the problems, each national government becomes a small actor on the world stage. It must bear the cost of its own environmental measures, while the benefits accrue to all nations. There is a potential free rider problem on a global scale, where each individual country has insufficient national incentives to introduce adequate measures to control international pollution. And there is at present no supranational authority that can enforce an international tax policy, in contrast to what is the case in the national jurisdictions.

Fortunately, there are indications that this free rider problem is perhaps not quite as severe as economic theorists tend to believe. Thus, the U.K. government has recently presented plans for national reduction of CO_2 emissions that seem to go well beyond what one would expect from calculations based on pure national self-interest. International progress in this area depends on the willingness of some countries to take a lead in introducing carbon taxes and possibly supplementary regulations. An interesting issue is what the ideal policy for the world as a whole should be. What should be the structure of a global carbon tax?

There is a strong efficiency argument in favour of a uniform global tax on carbon emissions; this has recently been strongly recommended in the *Stern Review* (Stern 2007). The argument is basically the same as the one that applies to the national economy: By letting all polluters face the same tax on emissions, one ensures that the targeted reduction of global emissions is achieved at the lowest possible cost to the world as a whole. But this is a “first best policy”; there are no political or institutional constraints on the choice of policy

instruments. We need to ask if there are features of the problem that call for a modification of the ideal policy.

Under ideal conditions, production efficiency is a desirable element of a welfare-maximizing policy. When a given reduction of pollution is achieved at minimum cost to the economy as a whole, one maximizes the total resources available for distribution among the members of society. Potentially, therefore, it becomes possible to give higher income to everyone than under any other policy alternative. However, the appeal of this argument is based on the assumption that society has adequate instruments for redistribution, and for many individual countries this is a reasonable assumption. But is it a reasonable one for the international community? There is admittedly some degree of international redistribution from the rich to the poor countries, but it is still a safe generalization that there is much less redistribution of income internationally than there is within the nation state, particularly as regards the Western welfare states. This provides an argument for designing the carbon tax in such a way that the burden on the poor countries becomes less than it would be under a uniform tax; it is worth giving up some production efficiency if this can result in a more equitable distribution of the costs of environmental improvement (Sandmo 2005). From this point of view unilateral increases of the carbon tax in the rich countries should be welcomed, even if the poor countries of the world do not follow their lead.

This is not meant to deny that an even better policy would be to combine a global uniform tax with increased international redistribution. But there is an obvious risk involved in letting tax and other policies against global warming wait for a radical improvement of the possibilities for international redistribution.

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