

ENVIRONMENTAL RESOURCES, TAX REFORM AND DOUBLE DIVIDENDS

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Abstract

Many poor developing countries have lower shares of non-tax revenue in total recurrent revenues of their central governments revealing untapped tax potentials, depend more heavily on international trade taxes which are highly distortionary and may not augur well for rapid economic growth, and at the same time are witnessing increasing damage of their environmental assets thereby eroding the prospects of achieving a sustainable development path. This paper shows that environmental taxes and subsidies can yield double dividends, especially in developing countries, and argues for green tax reforms.

Introduction

Since the publication of Schumacher's famously provocative hook "*Small is Beautiful* (1973) and the *Glut of Rome's* 1972 project on the "*Limits to Growth*", there has been a growth concern as to whether the world is treading an ecologically sustainable development path. An "ecologically sustainable path" is one that allocates resources in such a way that they do not threaten the stability either of the ecosystem as a whole or key components of the system and through this the welfare of future generation (Common and Perrings, 1991). At the same time, there is a re-emphasis on the possibility of using environmental taxes ("*Green Taxes*") and other instruments to limit the damages imposed by economic activities on nations' environmental resource base. Indeed debates on sustainable development have proliferated in the last three decades and environmental protection has - climbed up the political agenda, the so-called "*Greening of Politics*" (Schob, 2002).

Concerns about (the depletion of societies' environmental resources (comprising all gifts of nature, including land, animals, fish, plants, non-renewable and renewable energy and mineral resources and the services provided by these complex ecosystems: Hanley et al. (1997:427), are not unrounded. Air pollution by particulate matter is very high in most of the cities of China and India, in Cairo (Egypt) and Jakarta (Indonesia) reaching as high as 149 micrograms per cubic meter in Tainjin (China), 187 in Delhi (India) and 103 in Jakarta (Indonesia). Similarly, many cities of China, Rio de Janeiro (Brazil), Tehran (Iran), Yokohama (Japan), Moscow (Russian Federation) and Istanbul (Turkey) record high levels of sulfur dioxide emission while Nitrogen dioxide emission is particularly high in Milan (Italy), Mexico City (Mexico), Cordoba (Argentina) as well as in a number of China's cities (World Bank, 2004). The situation may be worse in most of the cities in sub Saharan Africa for which data is unavailable. Also 35.48 percent of mammal species, 20.93 percent of bird species and 2.45 percent of higher plants species in Cuba are threatened. The figures for Madagascar are 35.46 percent, 15.69 percent and 1.7 percent respectively. Many other countries, including developed and high income ones, have higher percentage of their birds or higher plants species threatened (World Bank, 2004). Again Burundi average annual deforestation rate between 1990 and 2000 was 9 percent. This is followed by 5.7 percent for Haiti, 4.6 percent for El Salvador, 3.9 percent for Rwanda and 3.4 percent for Togo. Fig. 1 shows that, on-going environmental damages are not restricted to poor developing countries even though some types of damages appear to be characteristic of different income groups.

There are many ways to control environmental damages: direct regulatory command and control (CAC) mechanisms, market-based instruments such as tradable permits, technology mandates and pollution performance standards and the use of environmental taxes. Sale of tradable emission rights (auction permits) and taxes are a source of revenue for the government. They also stimulate investment in pollution abatement technology and confer a dynamic advantage because all firms have an incentive to reduce pollution in order to reduce the cost associated with taxes or the purchase of permits. But the magnitude of the effect on the level of pollution is more predictable with rights than with taxes, since in the former case the level is specifically predetermined rather than estimated as in the case of taxes. This holds however if the administrative apparatus used to set and monitor pollution levels is efficient (Acocella, 1998:227). While tradable rights sets the level of diseconomy

and allows the market to fix its price, taxation acts on the price imputed to the external diseconomy leaving it to the firm to decide on the quantity.

The use of taxation to correct an environmental damage was first suggested by Pigou in 1920. However, the enthusiasm for environmental taxes (the "*green tax reform*"- reorienting the tax system so that it focuses more on "bails" like pollution and less on goods like labour effort or savings and investment decision) gained momentum only in the 1990s with the introduction of the "*double dividend hypothesis*". Some authors (e.g. Schob, 2002), distinguish between the "strong" and "weak" form of the hypothesis. In its "strong form", the hypothesis asserts that, "a given tax reform does not only improve the environment but also increases non-environmental welfare". In this case, it becomes a "no-regret" option in the sense that even if the environmental benefits are in doubt, the tax reform may still be desirable (Bovenberg, 1994:421). However, in general, the double dividend hypothesis is used to imply the weak form in which a revenue-neutral environmental tax reform generates both environmental benefits as well as efficiency gains.

This paper shows that, environmental taxes and subsidies can yield double dividends, especially in developing countries, and argues for green tax reforms. Section 2 provides a review of the theoretical and empirical underpinnings of "green taxes" and the "*double dividends hypothesis*". while the third section shows that, the potentials for this realization is available in many developing countries. The last section draws out some policy implications and concludes.

Theoretical and Empirical Review of Green Taxes and Double Dividends

Tullock (1967), was the first to advance the idea of "double dividends" from an increase in environmental tax, even though the term was first used by Pearce (1991). Based on estimates of the excess burden of taxation for the US economy, Pearce (1991), argues that, every dollar of revenue raised with a carbon tax amounts to an effective tax of only 50-80cents, since the revenue will be "recycled" into the tax system allowing the distortion inherent in the system to be reduced". Underlying the "*double dividends hypothesis*" is Sandmo's (1975), integration of Ramsey's (1927), optimal revenue-raising tax and Pigou's optimal corrective tax. The latter "assumes there are no revenue-raising taxes in the economy and that revenue generated from the environmental tax are simply returned to the economy as lump-sum transfers", while the former focuses on revenue and ignores externalities. At one level, the hypothesis asserts the complementarities between a corrective tax that raises revenue and a revenue-raising tax that discourages pollution (Jaeger, 2003).

In general, the hypothesis suggests there are two benefits (dividends) that can be realized from an environmental tax or an increase in the tax. The first is a reduction in the level of pollution (an improvement in the environment), which the tax generates. The second is an improvement in economic efficiency that arises when the revenue from the tax is used to reduce other distortionary taxes, such as income tax which distorts labour and saving decisions, so that the overall distortion in the economy is reduced while the revenue swap leaves government's tax revenue unchanged (Fullerton and Metcalf, 1997). According to the authors, "estimates suggest that for the US economy, an additional dollar of revenue from income tax imposes a burden on the private sector of about \$1.35. The 35 cents difference is thus the "excess burden" and answers to the distortionary impact of the tax on the efficiency of the market economy. Reducing income tax can reduce this excess burden and hence enhance efficiency.

The hypothesis of double dividends from a "*green tax reform*" has been questioned by several authors, however (see, for example, Bovenberg and de Mooji, 1994). Goulder and Parry (2000), assert that, environmental taxes are implied factor taxes that compound existing factor market distortions. Parry and Bento (2000), are also of the view that, "the cost of achieving any given amount of pollution abatement (whether by environmental tax or command-and-control regulations) is higher in the presence of distortionary taxes than the cost in an economy with no such taxes. According to these authors, a positive second dividend exists only if the excess burden of the total system - including the excess burden of the environmental tax - declines.

Fullerton and Metcalf (1997), provide a general assessment of the "double dividend" literature, by touching on issues they believed both proponents and opponents of the hypothesis overlooked. In the authors view, the benefit of adding an environmental tax levy depends on the starting point. In addition, a well-defined "green reform" may generate environmental benefits and reduce other existing distortions irrespective of whether or not it raises revenue. To buttress this point.

the authors cites three types of reform that potentially yield identical economic outcomes: a non revenue raising type of command-and-control regulation; a combination of an environmental tax increase and

income tax reduction; and a revenue-losing environmental subsidy financed by marginal increase in other taxes. Given the above possibility, the choice of instrument will obviously depend on considerations other than revenue, such as case of administration, enforceability and enactment. Again, the nature of the demand curve for an environmentally hazardous good may dictate the type of instrument that will best achieve results. If the demand curve is highly inelastic, the imposition of a green tax or increase in the existing tax rate will yield large revenues but may not significantly reduce the environmental damage. Again, if demand is highly elastic, environmental damage from the good would be highly reduced by the imposition or increase but not much revenue may accrue to government. In both cases, other market instruments such as tradable permits or non-market instrument, like administrative charges, may be more appropriate. But where demand is unitary or near unitary elastic, the use of green (tax) may be more effective in achieving double dividends.

Goulder and Parry (2000), provide a general set of circumstances under which double dividends can arise. These include:

- (i) When polluting good is a relatively weak substitute for leisure, e.g. cigarettes, "recreational vehicles", etc. Taxes on such goods *could* produce double dividends.
- (ii) In the case of an inefficient relative taxation of multiple factors of production (e.g. if one factor, say capital, is initially overtaxed relative to the other, say labour) and the environmental reform tends to improve the relative taxation of the factors.
- (iii) When there is significant environmental feedbacks, i.e., when environmental improvements from *green tax reform* feedback on the functioning of labour and capital markets through improved human health and productivity. Parry and Bento (2000), finds, for example, that "revenue-neutral" congestion taxes can encourage labour force participation at the margin by raising household's wage, net taxes and commuting cost.
- (iv) In cases of lax-deductible consumption expenditures, e.g., mortgage interest for owner-occupiers and employee-provided medical insurance. In general, the tax system distorts the choice between lax-favored spending and ordinary (non-taxed-favored) spending in addition to distorting (actor) markets. This implies that recycling environmental tax revenues through income tax reductions yield an especially large "*revenue recycling effect*" by reducing the effective subsidy on tax-favored spending" (i.e., the "*subsidy-interaction effect*") (Parry and Bento, 2000).

Coxhead (2000), suggest that, the scope of achieving double dividends may be greater in developing countries compared to industrial economies, but as a "side effect of the reform of existing taxes" rather than the imposition of explicit environmental taxes. Similarly, Beglun and Dessus (1999), find evidence of improved welfare from swapping environmental taxes for trade distortions (trade/environment double dividends) in the case of Chile.

A Case for Green Tax Reform in Developing and Resource-Dependent Countries

For most poor countries and many others dependent on natural resources such as oil, the share of non-tax revenue in total central government revenue is still very high revealing unexplored revenue potentials available through taxes. This contrast with the low figures for most advanced and high income countries (Table I). Data from the World Bank (2004), also shows that, over the last one and half decades, some countries, such as Bolivia, China, Guinea, Madagascar, New Zealand and Papua New Guinea have been able to carry out positive reforms that have more than halved the share of nontax revenue in total centrally collected revenue. However, some others, such as Congo Rep . Indonesia, Jamaica, and Peru have more than doubled their dependence on non-tax revenue.

Many developing and low income countries also rely heavily on taxes on international trade which is highly distortionary compared to countries like Australia, Denmark, Estonia, Ireland, Norway, Sweden, United Arab Emirates and United Kingdom with zero percent share of total tax revenue, a high income countries average share of 1 percent, and Europe and Central Asia average share of 3 percent. Most of these countries are also witnessing increasing damage of their environmental assets thereby eroding the prospects of achieving a sustainable development path.

A number of contradictions are also evident. For example, taxes on environmental negative externalities generated by resource extractions in many resource-dependent countries are often ridiculously low such that firms find it profitable to increase damages rather than invest in environmental-friendly technology. The evidence suggests that charges seldom, if ever, reflect an explicitly measured social

marginal damage function. In practice, they reflect an implicit marginal penalty function determined by local decision-making process that incorporates not only pollution damage but also political factors (Wang and Wheeler, 2003). Typically, the incentives are set too low to induce producers to increase pollution control to the socially optimal level (Hanley et al., 1997:00, see also Shibli and Markandya, 1995; Florig et al., 1995; Yang, Cao and Wang, 1997; Yun, 1998 for case studies).

In Nigeria for example, lines for gas flaring are insignificant and it is generally cheaper for all companies to continue to flare gas than to invest in gas projects (Table 2). At the end of the 1980s, Chevron, a major foreign oil company in the country, noted that compliance with the Gas Re-injection decree would cost the company US\$56 million compared with a mere US\$1 million/year which the company had to pay in gas flaring lines (Akpan, 1997:267). Thus, at present, large-scale gas flaring continues in Nigeria with the country contributing about 19 percent of the total gas flared globally, a share equal to that of all other African countries put together (*The Guardian*, Lagos, 1 October, 2001)

Also most developing countries impose high taxes on new or fairly new automobiles and relatively lower taxes on fairly used cars, which generate greater environmental damages thus, creating an environmentally unfriendly incentive structure. In the area of tobacco-related environmental hazards, Lagos state (in Nigeria) is said to have recorded 9, 527 reported cases of tobacco-related diseases in 2006, alone and to have spend a minimum of N316, 000 monthly on each of these cases (Gbadamosi, 2007).

All of these underscore the need for green tax reform, an exercise that makes changes in the design and structure of taxes in order to improve societal welfare. This may include broadening the tax base, changing the tax mix, introducing new taxes or abolishing some old ones or changing the thresholds or tax brackets. Generally, a tax structure should be stable and productive in terms of revenue, minimize distortions especially on labour supply, investment and trade; and address the intra and inter-generational equity in resource allocation by reducing damages to society's environmental resource base.

It may be argued that the "Goulder-Parry (2000), conditions" for double dividends from green tax reforms are largely present in most developing countries including Nigeria. Such reforms could help achieve greater efficiency and equity; two objectives that often require some amount of trade off and are rarely jointly achieved. Hussain (2003), shows, for example, the potential efficiency and equity gains that may accrue to a developing country from increasing taxes on petrol (fuel) while subsidizing the pump price of kerosene. The latter is a substitute for firewood and its price is likely to affect the demand for firewood. Hut increasing use of firewood leads to deforestation and also increased air pollution. A subsidy on (the price of kerosene (within the range that discourages its use in the adulteration of other fuels) could address the deforestation and pollution externality apart from being desirable on equity grounds (since kerosene is mainly used by low-income groups). Also in many developed countries, governments provide efficient public transportation systems and impose fuel taxes to particularly discourage excessive use of private motor vehicles in order to address the environmental pollution and urban congestion problem. Some other countries, such as Singapore, impose limits on the number of vehicles that are allowed in big cities and make use of price-based auction for allocation, which generates revenue to government in addition to the environmental benefit (Hossain, 2003).

In the light of the above, developing countries, especially those in Sub-Saharan Africa are encouraged to undertake tax reforms aimed at achieving the twin objectives of revenue generation and environmental sustainability. Increasing taxes on "bads" like pollution and on commodities like tobacco and alcohol, and (the introduction of road use taxes on private vehicles are likely to have positive effects on overall social welfare. This is more likely when they are complemented with subsidies on domestic gas production and investment in efficient intra-city public transportation systems. While these latter instruments have potentials for reducing environmental damages, they can also promote equity.

Conclusion

With many poor developing countries having lower shares of non-tax revenue in total recurrent revenues of their central governments and at the same time witnessing increasing damages to their environmental assets thereby eroding the prospects of achieving a sustainable development, this paper shows that, environmental taxes and subsidies can yield double dividends and argues for green tax reforms. The "double dividends hypothesis" is important in that it shows the possibility of using tax reform to increase efficiency, and hence, economic growth, in a second-best world. Despite the debate on the possibility of a second dividend, it remains that environmental taxes may help achieve one of two different kinds of goals or both: the provision of public goods with revenue generated from such taxes and the protection of environmental quality. As Jaeger (2003), observes, "the joint pursuit of both goals using

taxation can enable government to justify doing more of both by making the optimal environmental tax higher than it otherwise would be, and by lowering distortionary cost of financing the provision of public goods”.

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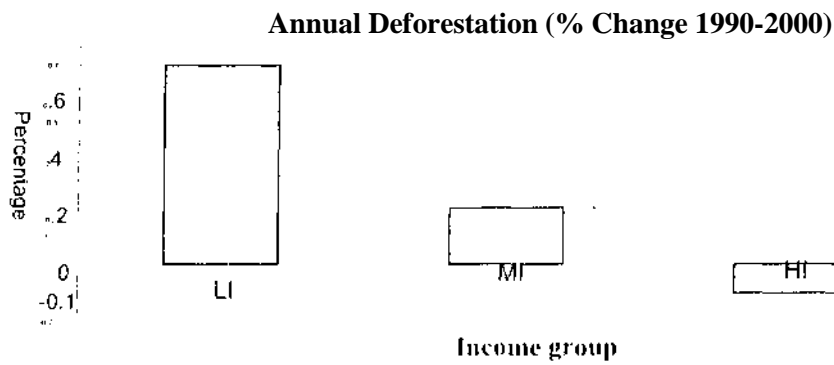
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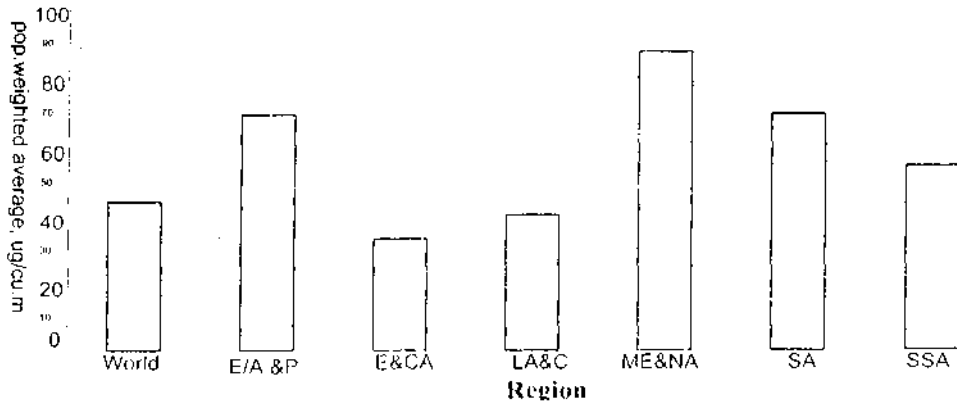
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Appendix

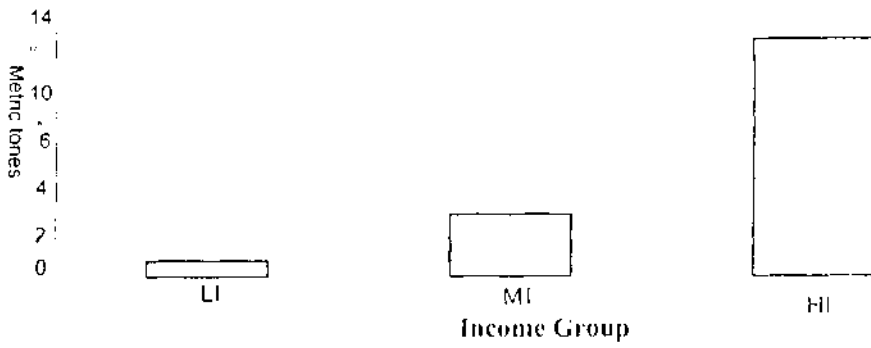
Fig. 1: Some Indices of Environmental Damage by Regions and Income Groups



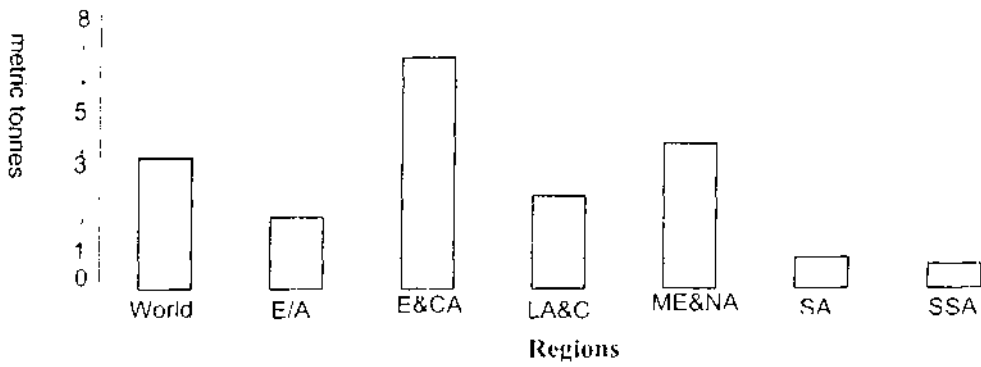
Pollution by Pollution

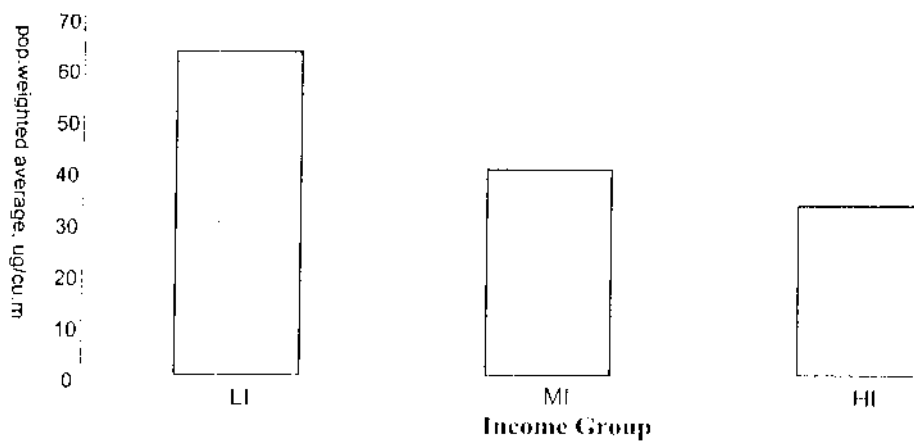


CO2 Emission Per Capita



CO2 Emission Per Capita





Notes

LI¹ Low Income; MI Middle Income; E/A= Last Asia; EA&P= Last Asia and Pacific; li&CA~ Europe and Central America; LA&C~ Latin America and Caribbean; ME&NA= Middle East and North Africa; SA = South Asia; SSA = Sub Saharan Africa; HI=High Income; E&EMIJ = Europe and EMU. (Source: World Bank, World Development Indicators, 2004: CD-Rom).

Table 1 Some Indications of Tax Structure in Selected Countries

S/N	Country	Non-Tax Revenue as Percentage of Total Current revenue	Taxes on International Trade as Percentage of Total Current Revenue
1	Bangladesh (2001)	25	23
2	Botswana (1990)	46	13
3	Cameroon (1990)	28	28
4	Congo, Dem. Rep. (2001)	66	32
5	Cote d'Ivoire (2001)	4	42
6	Dominican Republic (2001)	8	43
7	Egypt, Arab Rep. (1990)	27	Na
8	Ethiopia (2001)	32	26
9	Gabon (1990)	32	Na
10	India (2000)	24	29
11	Indonesia (2001)	36	3
12	Iran, Islamic Rep. (2001)	60	7
13	Jordan (2001)	24	17
14	Kuwait (2001)	90	2
15	Lebanon(2001)	28	28
16	Madagascar (2001)	3	52
17	Malaysia (1990)	28	18
18	Mauritius (2001)	15	25
19	Namibia (2001)	8	37
20	Oman (2001)	73	3
21	Pakistan (2001)	21	12
22	Senegal(2001)	4	37
23	Sierra Leone (2001)	4	49
24	South Africa (2001)	5	4
..25	Swaziland (2001)	5	52 ;

26	Uganda(2001)	50	1	
27	High Income countries (2001)	9	1	
28	Europe and Central Asia (2001)	10	3	

Source: World Bank, World Development Indicators, 2004. CD-Rom

Table 2: Gas Haring and Royally Payments of the Major Oil Companies in Nigeria (N000) in 1994

Elf	Mobil	Shell	Agip	Chevron	Texaco
Flaring fine 5,631	142,172	45, 812	19,121	41,127	4,886
Royalty	3,035,262	7,867,852	1,780,944	3,346,626	714,578
Fine as % of Royalty 0.18	4.68	0.58	1.07	1.20	0.68

Source: Frynas (2000:89).