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INNOVATIVE FINANCIAL MECHANISMS FOR SUSTAINABLE DEVELOPMENT: OVERCOMING THE POLITICAL OBSTACLES TO INTERNATIONAL TAXATION*

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Bernard P. Herber

EXECUTIVE SUMMARY

The present means of financing international and global policies directed toward the attainment of sustainable economic development are seriously deficient since they are largely dependent upon either (i) the financing by individual nations of their own participation in an international environmental agreement, or (ii) the voluntary contribution of burden shares by nations to a centralized supranational budget. In both instances, revenue flows are erratic and unstable since neither instrument provides for the automatic generation of revenues. The answer to obtaining stable international revenue flows for environmental purposes may be found in the use of *international tax instruments* that automatically generate revenues as a function of economic activity in the form of income generation, wealth accumulation, or market transactions. The last of these three tax bases, the market sales of goods and resources, is observed to have the greatest potential for effective use in international environmental finance.

Section I provides an economic rationale for international environmental policy based upon the phenomenon of inter-nation and global externalities as often accompanied by common property resource characteristics. Sometimes diverse interests of industrial and developing nations may add to the complexity of the situation. International environmental agreements seek to overcome the free-rider behavior of nations that results from the multinational characteristics of the externalities. Unfortunately, these agreements function under the circumstances of *noncorrespondence* since the externalities cover a geographical area that is larger than the sovereign political authority of any one nation. Yet, nations are understandably reluctant to yield their sovereign powers of taxation to policy makers at the supranational level. Despite this political impasse, international tax instruments, inter-nation financial transfers, and trust funds may serve as useful policy tools for dealing with the environmental problems at hand.

Section II evaluates five alternative international taxation and finance instruments, keeping the political barriers to international taxation in mind. The performance of particular instruments is measured against the efficiency, fairness

or equity, and revenue adequacy criteria of traditional (domestic) public finance. The revenue yield problems associated with the much used national self-financing and burden sharing instruments are demonstrated as several existing environmental regimes utilizing the burden sharing instrument are considered. The contrasting revenue automaticity attributes of harmonized national taxes and nonsovereign international taxes are demonstrated. Existing uses of such taxes are described, including those contained in the financial operations of the International Oil Pollution Compensation Fund and the European Union. Meanwhile, international taxes levied by "sovereign" supranational governments are rejected as politically infeasible.

Section III, building upon the analysis of the problems and policy instruments provided in the first two sections, evaluates the performance of three proposed taxes that may be used for international environmental finance. These are: the international foreign exchange transactions tax, the international air transport tax, and the international carbon tax. All three taxes would go beyond the revenue restrictions of burden sharing so as to automatically generate revenues as a function of economic activity in the form of particular types of market transactions. It is observed that the greatest revenue potential is offered by the international carbon and foreign exchange transactions taxes. It is further observed that the greatest environmental efficiency gains would be forthcoming from an international carbon tax, with the foreign exchange transactions tax leaving environmental efficiency unaffected. The least fair of the three proposed taxes, in ability-to-pay terms, would be the international carbon tax, though such "regressivity" could be offset through a "progressive" use of the tax revenues in the expenditures financed by the tax. Various options for using the increased revenues that would be generated through the adoption of such innovative taxes are considered including their linkage to environmental trust funds.

The paper concludes with the presentation of several suggested criteria for the path of "least political resistance" to the adoption of international environmental taxes. These include the minimum possible delegation of national taxation authority in a tax regime; home-nation retention of some of the tax revenues; meaningful linkages between the taxes and the expenditures which they finance such as in the form of trust funds; use of the taxes as a part of more comprehensive and eclectic policy regimes; an evolutionary or gradual approach to the development of new taxes, and focus upon the efficiency associated with certain proposed taxes. In the final analysis, a global consensus regarding the need for innovative new international environmental taxes is the most important parameter for their acceptance.

I. INTERNATIONAL ENVIRONMENTAL EXTERNALITIES, DEVELOPING NATION INTERESTS, AND THE ROLE OF INTERNATIONAL TAXATION

This paper will consider innovative international financial mechanisms and, especially, international environmental taxes, for the advancement of sustainable development in the global economy. Written from the perspective of the public sector economist, it strives to adapt the traditional theories and policy instruments of domestic public finance to an international public finance setting in which political sovereignty is partitioned among the 200 nations of the world. The analysis is tempered by the enormous political obstacles which confront any effort to extend the coveted taxation powers of nations above the national level. The recommendations of the paper cautiously attempt to bridge the gap that exists between the largely ineffective burden sharing means of financing international government, which is itself a direct reflection of the efforts of nations to preserve their taxation powers, and the need for new and improved financial instruments to pursue the objectives of Agenda 21.

The policy approach advocated herein is *eclectic* in nature, that is, it recognizes the desirability of utilizing a mixture of policy instruments to attain environmental objectives. These include widely diversified economic and regulatory tools. The economic component is further classified into those instruments that are primarily of a fiscal nature and those that take on predominant market characteristics. The focus of the present paper is upon fiscal devices, in general, and upon *taxation*, in particular. As such, it does not emphasize Official Development Assistance (ODA), loans from multinational institutions, and private sector investment.

The use of tax instruments to help internalize (adjust for) environmental externalities or spillovers[1] that occur between nations is made difficult by the fact that the range of such externalities covers a larger geographical area than the sovereign political area of any one nation. This is known as the problem of *noncorrespondence*. Thus, only nations possess the political authority to impose taxes and other policy instruments to remedy the externalities, but the incentives to do so are greatly reduced by the shared multinational nature of such spillovers. The usual result is "free-rider behavior" whereby each nation waits for other nations to take action. In lieu of a politically unacceptable solution that would

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Externalities (spillovers) are defined as economic effects, both good and bad, which escape market pricing and which, in the present discussion, also escape the political control of any one nation.

see a "sovereign" supranational government established to eliminate this noncorrespondence between the economic and political dimensions of the problems, nations frequently negotiate *international environmental agreements* (Barrett, 1991; Scovassi and Treves, 1992) which deal with the problems without surrendering national sovereignty. However, even under such agreements, an extreme reluctance to delegate "tax powers" may be observed.

Thus, environmental externalities that cross national political borders provide a major challenge to the attainment of sustainable development in the global economy. If these flow only from one nation to another nation, they are called "unidirectional" externalities. If they flow simultaneously between two or more nations, they are categorized as "reciprocal" externalities. For example, consider the case of a developing nation that manages its rain forests in an economically sustainable manner, thus yielding "unidirectional" externalities of a positive or beneficial nature to the other nations of the world by helping to absorb excess carbon emissions from the atmosphere. Or, consider the fact that all nations mutually harm each other in the form of negative "reciprocal" externalities when they discharge carbon into the atmosphere. To further complicate matters, the common property nature of the atmosphere also encourages free-rider behavior. It is a shared resource that has a "zero access cost."

Moreover, the division of the world's nations into industrial nation and developing nation categories adds another dimension to global environmental problems. For example, in relationship to the global warming problem, industrial nations are the primary emitters of carbon pollution while a few developing nations own the rain forests that help to sequester excess carbon (Panayotou, 1992). Adding to the complexity, the demand for a clean global atmosphere tends to be income-elastic[2], thus making it a higher-priority consumption good for higher per capita income industrial nations than for lower per capita income developing nations. As a result, industrial nations generally exhibit a stronger demand for a clean atmosphere and other environmental public goods.

Figure 1 helps both to demonstrate the policy conflicts that arise between developing and industrial nations in global environmental issues as well as to provide an economic rationale for financial transfers from industrial to

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[2]Income elasticity is a microeconomic concept that views the quantity demanded of an economic good as a function of the income of a consumer (nation). An "elastic" income elasticity relationship means that as income increases, the quantity demanded of an economic good (here, a "clean atmosphere") increases more than proportionately to income.

CORRIGENDA

INNNOVATIVE FINANCIAL MECHANISMS FOR SUSTAINABLE DEVELOPMENT: OVERCOMING THE POLITICAL OBSTACLES TO INTERNATIONAL TAXATION

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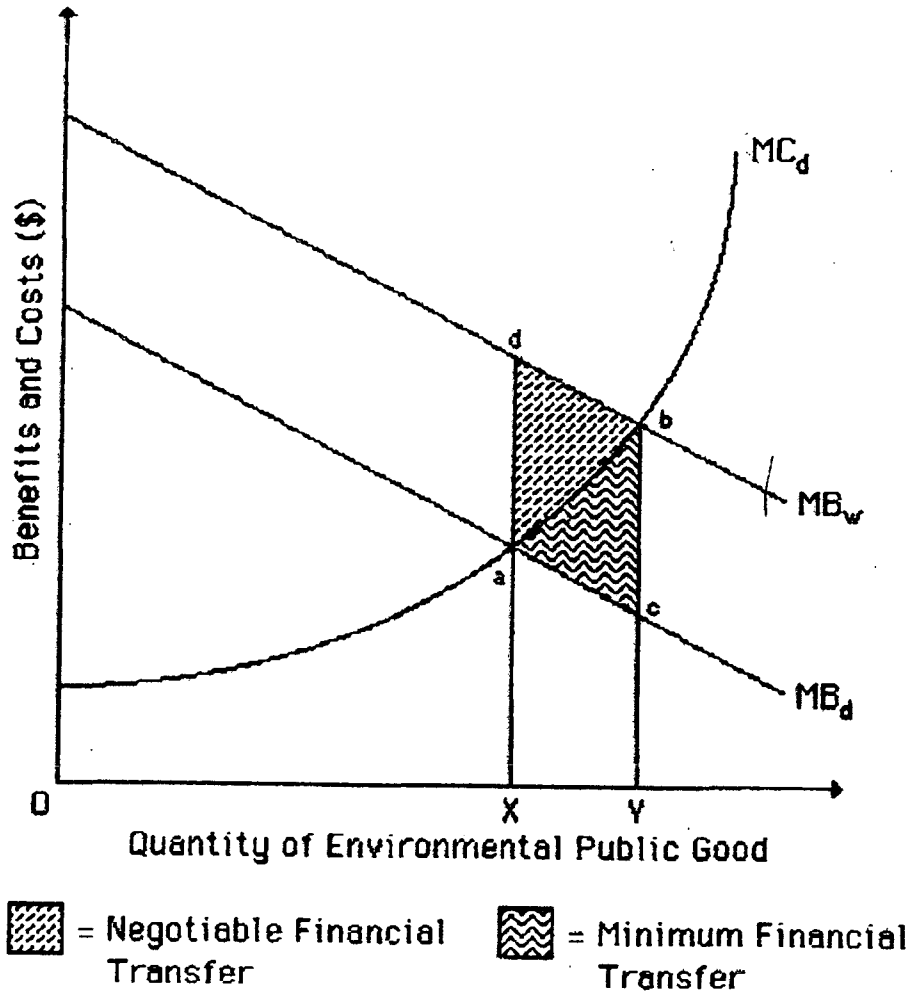
FIGURE 1
DEVELOPING-NATION ENVIRONMENTAL PUBLIC GOOD AND INTERNATIONAL FINANCIAL TRANSFERS



OY = Efficient World Quantity
OX = Efficient Developing-Nation Quantity

Table 1
ALTERNATIVE INSTRUMENTS OF INTERNATIONAL TAXATION AND FINANCE

Instrument	Performance			
	Automatic Tax Revenues[1]	Relative Price Effects[2]	Finance Supranational Expenditures	Loss of National Taxation Powers
National Self Financing from Domestic Taxes	NO	NO	NO	NO
Burden Sharing	NO	NO	YES	NO
Harmonized National Taxes	YES	YES	YES	NO
Non-Sovereign International Tax	YES	YES	YES	PARTIAL
Sovereign International Tax	YES	YES	YES	YES

[1] Revenue Criterion
[2] Efficiency Criterion

developing nations as a policy instrument. Consider the economic good in question to be an environmental public good such as the conservation of rainforests in a developing nation. Curve MB_d represents marginal benefits that would accrue to developing nation A from various levels of conservation of its own rain forests. Curve MB_w depicts the marginal benefits that would accrue to the world from such conservation. The space between curves MB_w and MB_d displays the environmental externalities that would result from various levels of conservation effort by nation A in excess of the benefits that nation A itself would enjoy. Curve MC_d represents the marginal costs to nation A for various levels of rainforest conservation.

The optimal level of rain forest conservation for nation A is quantity OX, as determined by the intersection of MB_d and MC_d at point a, which is less than the optimal world quantity OY, as determined by the intersection of MB_w and MC_d at point b. Hence, there is an opportunity for "global welfare gains" via the internalization of those environmental externalities represented between rain forest conservation quantities OX and OY. The minimum financial transfer necessary to induce nation A to conserve its rain forests at the global optimal level OY, that is, the amount that would compensate nation A for its incremental costs in supplying quantity OY, is the area *abc*. However, since the overall global benefits between OX and OY conservation levels are equal to the area *abc+abd*, the world could also pay part, or all, of *abd* in order to help attain this outcome. In fact, area *abd* becomes a "political bargaining zone" between the world and the developing nation with the final outcome being indeterminate in economic terms. The various means of financing inter-nation financial transfers such as those called for above, as well as for the financing of other international and global environmental policies, will now be considered.

II. ALTERNATIVE INSTRUMENTS OF INTERNATIONAL TAXATION AND FINANCE

Traditional public finance within nations utilizes income, wealth or property, and market sales or transactions as its primary objects of taxation. *International public finance*[3] may utilize any of these tax bases, but political feasibility lends its greatest support to the market sales or transactions base due to its indirect or impersonal nature which avoids the direct taxation of the income or wealth of a person. Both domestic and international pubic finance are concerned with economic efficiency, fairness in the distribution of tax burdens, and the generation of revenues for the financing of public expenditures. Fiscal federalism, a component of domestic public finance that deals with budgetary interaction between the governments of a nation, also has important international applicability. The paper will now turn to an analysis of the major *alternative instruments of international taxation and finance*. The performance of these instruments will be evaluated in relationship to economic efficiency, fairness, revenue adequacy, and political acceptability criteria. Table 1 summarizes the instruments and their performance results.

National Self Financing from Domestic Taxes

Many international agreements, both of an environmental and nonenvironmental nature, follow a simple approach whereby each nation party to the agreement finances its own activities undertaken in relationship to the agreement. The nation finances these activities from its own national revenue sources. International public finance, as such, does not exist since there is no central budget nor trust fund to be financed nor is there any use of harmonized[4] taxes. This polar case is listed at the top of Table 1. It provides a benchmark for the remaining instruments, all of which entail multinational finance.

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[3] **International public finance, that is, the use of tax and other fiscal instruments "beyond national boundaries" for allocational, distributional, and macroeconomic (stabilization) purposes, has received increasing attention during recent years (see Mendez, 1992; Herber 1995).**

[4] **Taxes imposed by nations that are coordinated across these nations via an international agreement.**

Burden Sharing

The reluctance of nations to delegate the jealously guarded "power to tax" to a supranational body, or even to agree upon internationally harmonized national taxes, has resulted in the widespread use of burden sharing to finance international organizations and policies. Under burden sharing, the nations party to an international agreement move beyond the self financing of their own treaty-related activities to an unsophisticated form of centralized budgetary finance. Unfortunately, burden sharing lacks the *automatic revenue generation* of a tax since it avoids the direct use of a conventional tax base such as income, wealth, or market transactions.

Instead, the burden sharing instrument consists of a *voluntary* commitment by a nation to make financial contributions to help finance the multinational goals of an agreement. Since burden share contributions may be financed from any revenue source that a nation chooses, the nation suffers no direct loss in taxation autonomy. The enforcement of burden share payments tends to be weak, with nations frequently delaying, if not avoiding altogether, the payment of their burden shares. Moreover, since burden share revenues, unlike a tax, are not a function of an economic activity, there is no possibility of "changing relative prices" so as to internalize environmental externalities and increase economic efficiency.[5] However, burden sharing revenues, like tax revenues, can be earmarked for particular international environmental expenditures or trust funds. Moreover, a normative fairness criterion can be part of an assessment formula to assign burden shares on the basis of national per capita income or GDP differentials. Several contemporary uses of burden sharing as an instrument of international environmental finance will now be considered.

An early use of burden sharing to finance global environmental policy may be found in the World Heritage Fund established by international treaty in 1972. This fund, officially named the "Fund for the Protection of the World Cultural and Natural Heritage," strives under its environmental component to preserve the unidirectional externalities that emanate from the unique natural resource

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[5]An important aspect of public finance policy for the purpose of increasing economic efficiency is the imposition of a tax upon the economic activity causing negative externalities, such as a tax levied upon the use of carbon-emitting fossil fuels in the production of energy. Such a tax is called a "Pigovian tax" (Pigou, 1920). A "relative price change or effect" occurs in the form of the price increase caused by the tax, resulting in a reduction in the level of the externalities. The extent of such a reduction will depend upon the price elasticity of demand for the economic good or resource causing the externalities.

endowment of one nation to the benefit of other nations. The fund is financed via burden shares assigned under a formula that sets a flat percentage contribution for all nations not to exceed one percent of a nation's contribution to the regular budget of UNESCO. Both joint-nation and nation-specific benefits are recognized since a nation receiving financial assistance is expected, if possible, to contribute a substantial share of the costs of an approved project. Fund revenues pay for research studies, the hiring of technical experts, preferential loans, and financial transfers.

Another use of burden sharing is found in the Multilateral Fund of the Montreal Protocol -- a mechanism for transferring revenues from industrial to developing nations to assist the latter in avoiding the use of ozone depleting chemical substances such as chloroflurocarbons (CFCs). Burden shares are assigned under a formula based upon the scale of assessments used in the United Nations. The fund became operational on an interim basis during 1991-1993 and, subsequently, has been made permanent. The Montreal Protocol has been ratified by more than 100 nations.

The most comprehensive use of burden sharing on a global environmental basis is found in the financing of the Global Environment Facility (GEF). This environmental regime began to function in 1991 after negotiations between leading industrial nations and the Bretton Woods institutions. Unlike most such bodies, it is not the result of a formal international treaty but, instead, emerged from informal diplomatic negotiations. At the present time, GEF has widespread membership among both industrial and developing nations. Its policy areas encompass a comprehensive range of global environmental problems: global warming, ozone depletion, international waters and oceans, and biological diversity. It is governed by its own administrative institutions in cooperation with the World Bank, UNDP, and UNEP.

The Global Environment Facility utilizes the trust fund device for providing financial assistance to developing nations for specific projects within its mandated four environmental problem areas. It operated on an interim basis for the period 1991-1993, and now has been made permanent. Burden shares were initially made without the use of a formula. However, they are now assigned on the basis of the United Nations scale of assessments. Its current funding total for the period 1994-1996 is $2.2 billion. GEF has been named the interim financial mechanism for the Framework Convention on Climate Change and the Convention on Biological Diversity that emerged from the 1992 Earth Summit.

Although burden sharing has enjoyed some success in the above uses, it remains a voluntary and unstable means of international environmental finance. Improved mechanisms are needed if international and global environmental agreements are to succeed in their pursuit of sustainable economic development in the "Spirit of Agenda 21." Undoubtedly, stable and reliable financing of all international institutions, whether of an environmental or nonenvironmental nature, cannot occur unless the world can find, and agree upon, the use of revenue-generating instruments that are comparable to those used within nations. There is only *one answer* to this dilemma, namely, the expanded use of *tax instruments* at the international level. What makes government finance work "within nations" and the financing of "international government" not work very well is the fact that national finance utilizes taxation as its primary revenue source while international finance does not. Burden sharing, for example, lacks *revenue automaticity* while, under a "true tax," the tax base automatically generates revenues as a function of economic activity.

Thus, in crossing the bridge over the deep chasm that lies between revenue "reliability" at the *national* level and revenue "unreliability" at the *international* level, one must confront -- and hope to overcome -- the extremely formidable political obstacles which stand in the way of international taxation. Understandably, sovereign nations jealously guard the power of taxation. Yet, this fact is not logically inconsistent with the judicious use of international tax instruments for important multinational purposes. However, it does mean that innovative means of international public finance must be found that encounter the least possible political resistance of nations to their adoption. To say that such a task is "easy" would be foolish. To say that such a task is "impossible" would be unduly pessimistic. Meanwhile, the concept of international taxation has been under consideration since at least 1884, as pointed out by Frankman (1996).

Attention will now be directed to the three remaining instruments summarized in Table 1, having demonstrated that individual-nation self financing and burden sharing fail to provide both stable revenue flows and a mechanism for relative price changes that contribute to economic efficiency. Importantly, these remaining instruments automatically generate revenues and can be designed to exert efficiency-enhancing relative price effects. They differ in such dimensions as the level of government, national or international, that imposes the tax and, in the latter case, whether the international government levying the tax is nonsovereign or sovereign.

Harmonized National Taxes

One appealing international taxation approach is for the nations signatory to an international treaty to agree upon the imposition of a particular tax, with the tax then being levied at the national level by each of the nations. The tax base could be either uniform or similar across nations depending upon the terms of the agreement. Such a tax would be "international" in the sense of a *harmonized* multinational agreement to impose the tax, but it would be "national" in the sense that each nation would directly levy the tax under its own sovereign political authority. The agreement would likely extend beyond the use of a particular tax base so as to include also the harmonization (but not necessarily the "uniformity") of tax rates as well as some understanding on the distribution and uses of the tax revenues.

Effective coordination is desirable in order to discourage free-rider behavior and resulting distortionary trade effects. Moreover, the question of existing national government subsidies that might conflict with the intent of the harmonized tax would need to be addressed. A clear political advantage of the harmonized national tax approach is that it allows "sovereignty-sensitive" nations, rather than an international body, to levy the tax.

The matter of retention by the home (taxing) nation of part, or all, of the revenues yielded by the tax may play a pivotal role in the political acceptance of the tax. The feasibility of home-nation revenue retention will be a function of such considerations as (a) the type of tax selected, that is, income, wealth, or sales, and (b) the environmental goals of the tax, that is, whether it is primarily to raise revenues for environmental expenditures, or whether it exists for the primary purpose of achieving efficiency gains via relative price effects. While any tax could be designed to yield a given amount of revenue to finance environmental spending, the greater the amount of revenues retained by the home nation, the lesser the amount of revenues available for multinational environmental expenditures. Hence, if the primary purpose of the tax is to finance supranational environmental spending, an inverse relationship exists between the attainment of that goal and revenue retention by the taxing nation.

On the other hand, if the primary purpose of the tax is to attain a specific efficiency objective such as the reduction of carbon emissions, that goal could be met regardless of whether the taxing nation or a supranational body receives the revenues. In fact, the harmonized national carbon tax proposed by the European Union in 1991 (but never adopted) called for all revenues to be retained by the taxing nation -- though it would have required that other national taxes be

reduced by an equal amount in order to meet its "revenue-neutrality" requirement. A corollary lesson to be learned: a Pigovian excise tax such as a carbon tax is superior to personal income or wealth taxes since it can simultaneously meet both the revenue and efficiency criteria for tax performance and not "get in the way" of the politically-advantageous home-nation retention of tax revenues. Still another attractive feature, but one that would trade off with its home-nation revenue retention feature, is its compatibility with the earmarking of revenues for trust funds and subsequent financial transfers in keeping with sound principles of fiscal federalism.

A limited version of the harmonized national tax approach may be found in the treaty that governs the Svalbard Islands. This treaty was initially applied to the mining of coal, but later extended to the exploitation of oil, in the Svalbard Islands archipelago in the Arctic Ocean off Norway. This six-nation treaty grants sovereignty over the islands to Norway, but then proceeds to limit this sovereignty by stipulating that taxes and duties collected in Svalbard by Norway must be used only in Svalbard. Moreover, it requires that such taxes must only be as high as necessary to cover the costs of administering the islands.

A much more important use of harmonized national taxes (but for "nonenvironmental" purposes) may be found in the coordinated use of the value-added tax (VAT) by the member nations of the European Union. One of the actions of the European Union (then, known as the Common Market), after the signing of the Treaties of Rome in 1957, was to require that all member nations adopt national value-added taxes. This was accompanied by a "border-tax-adjustment" that applied the destination principle of international trade to the member nations. Under this arrangement, the national VAT was removed when an economic good was exported from one to another member nation with the domestic VAT of the importing nation being levied on the good. This harmonized tax policy played a major role in achieving the economic efficiency gains provided by an internal free-trade zone or common market. The latter having been attained, the border tax adjustment was removed effective January 1, 1997, with a domestic value-added tax now being levied by the nation that produces an economic good (origin principle).

In addition to the aforementioned efficiency gains, the harmonized national value-added taxes of the European Union are the primary revenue source (see below) for the financing of its supranational government structure located .in Brussels. The standard "European Union" tax rate is 1.4 percent of the VAT base of each member nation, with the remaining VAT base and revenues being retained by the nation for its domestic spending purposes. Harmonization

arrangements require a minimum national VAT rate of 15 percent in each nation, levied upon largely similar national tax bases. These value-added taxes are the primary revenue source for the member nations themselves as well as for the European Union.

Nonsovereign International Taxes

An alternative approach to international environmental finance that would also satisfy both the revenue and efficiency criteria is the nonsovereign international tax. Under this approach, the tax would be imposed by a "nonsovereign" supranational body utilizing taxation authority delegated (*not* "relinquished") to it by the nations signatory to an international agreement.[6] The primary structural difference between this instrument and harmonized national taxes rests in the "level" at which the tax is imposed, that is, by a supranational body rather than by sovereign nations. In either case, any type of tax (income, wealth, or sales) may be used, though a sales tax possesses a "political feasibility" advantage since it is an impersonal tax that avoids the use of a person's income or wealth as the tax base. Moreover, a narrowbased (excise) form of sales tax can exert significant relative price effects, thus making it an ideal instrument for the abatement of negative environmental externalities. On the other hand, a "normative" drawback of sales taxation is its tendency to be regressive to income and, thus, in violation of the ability-to-pay principle.[7]

The question arises whether a nonsovereign taxation body should have its own tax collection system or whether it should utilize the national tax collection systems of the nations that have delegated authority to it. Undoubtedly, the latter option is "politically more acceptable" since it allows nations to be involved in the supranational taxation process. As an example, the member nations of the European Union collect the nonsovereign international taxes on economic goods

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[6]Delegation of sovereignty refers to a "voluntary" assignment of taxation authority to a supranational body which authority can be withdrawn at any time. By contrast, a relinquishment of sovereignty refers to a permanent "surrender" of sovereignty to a supranational government, thus giving the latter an autonomous right to exist and to tax.

[7]The "ability-to-pay" principle of tax fairness, a widely-used fairness criterion, concludes that tax payments should be "progressive" to income, that is, the proportion of income paid in taxes should be greater for higher-income than for lower-income persons in order to equalize the sacrifice of paying taxes. However, sales taxes tend to be "regressive" to income whereby lower-income persons pay a higher proportion of income in taxes than higher-income persons. This occurs because sales tax bases usually consist of necessity as opposed to luxury goods, with necessity goods being of greater importance in the budgets of lower-income persons.

and agricultural commodities imported from nonmember nations (see below). A question also arises as to the distribution of the tax revenues, that is, would any of the revenues be returned to the nation of tax base origin? Other important issues, common to all cases of supranational taxation, arise such as the differential industry and trade effects that are likely to occur among nations. Moreover, the distributional incidence among nations of centralized supranational expenditures must be considered.

Two contemporary examples of nonsovereign international environmental taxes will now be considered. The first of these occurs as part of the International Oil Pollution Compensation Fund (IOPC Fund) regime established under two interrelated treaties signed in 1969 (Civil Liability Convention) and 1971 (Fund Convention), respectively. Presently, 64 nations hold membership in the IOPC Fund. Its purpose is to pay compensation to the victims of oil spills from tankers in the territorial waters of nations as well as indemnification payments to shipowners when damages exceed the insurance coverage. This eclectic policy mechanism employs a mix of economic and regulatory policy tools (Herber, 1996).

The *economic* component is twofold: (i) a fiscal segment consisting of an excise tax (officially called a "contribution") which finances a trust fund that is the source of the compensation and indemnification payments, and (ii) private insurance coverage purchased in the market by shipowners. The *regulatory* component takes the form of the compulsory nature of the liability insurance that must be carried by the shipowners. Contributions to the fund, which are de facto Pigovian excise taxes linked to actual oil spillage incidents, are paid by the companies or persons who receive oil into a nation. A specified sum (the tax rate) is paid on each ton of oil (the tax base) brought into a nation. The IOPC Fund has a governance structure consisting of an Assembly of representatives from member nations and a Secretariat located in London.

A second nonsovereign international environmental tax regime is contained in the deep seabed provisions of the Law of the Sea Treaty. However, even though these taxes have been authorized, they have not actually been levied[8] due to the fact that seabed mining is not cost-effective under present technology[9].

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[8]Except for the collection of a "user fee" to cover the cost of mining applications.

[9]Although recent technological improvements bring "cost-effective" deep seabed mining closer to reality, political opposition to such taxes, at least in their present form, remains strong.

The taxes, which would be imposed by a nonsovereign supranational body, the International Seabed Authority, are of both the conventional *monetary* and unconventional *in-kind* varieties.

Monetary taxes consist of (i) a production excise (sales) tax, and (ii) a business income (profits) tax. The base of the *excise* tax is the mining output of private and state (national government) mining firms operating as one component of the so-called "parallel mining system" established by the treaty, the other component being the mining arm of the International Seabed Authority known as "The Enterprise." This tax would be levied as a fixed percentage of the market value of mining output. The *business income* tax base consists of the net income derived from the mining output of the private and state mining firms. At the discretion of the mining company, a combination of the two taxes may be used or, instead, only a production excise tax may be used. The in-kind taxes take the form of (i) the mandatory provision of a prospected *mining site*, and (ii) the mandatory transfer of *mining technology* by the private and state mining firms to The Enterprise for use in its mining operations.

Meanwhile, two nonsovereign international taxes levied by the European Union, though of a "nonenvironmental" nature, deserve attention. These are the customs duties on economic goods and the agricultural levies on agricultural commodities imported from nonmember nations. The tax base for each tax is uniform across the member nations as are the tax rates. Each nation is allowed to keep 10 percent of the tax proceeds to cover the administrative costs of collecting the taxes.[10] It is important to observe that these customs and agricultural import taxes are not harmonized national taxes. Instead, the tax bases and tax rates are "international" in nature -- only the collection mechanism is in the hands of the member nations. Hence, they are truly "nonsovereign international taxes."

The customs duties and agricultural levies combined contributed 21 percent and the harmonized value-added taxes 51 percent of European Union revenues in 1994. Meanwhile, 27 percent was provided by a revenue source of recent origin (1988) known as the fourth resource. This is a residual financial source that becomes operational when the VAT, customs, and agricultural taxes do not fully cover budgeted expenditures. The "tax rate" is calculated on the basis of the percentage of the combined Gross National Product of all member nations that would be required to yield the needed residual revenues. This uniform

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[10]**Also, a nation may keep 10 percent of the European Union's portion of the VAT revenues it collects.**

supranational rate, in turn, is levied as a flat percentage of the GNP of each nation -- the "tax base."

The fourth resource follows a generalized "ability-to-pay" format since those nations with larger GNPs provide greater revenues to the European Union budget[11]. Meanwhile, it is open to discussion whether the fourth resource instrument actually is a tax or, instead, is a sophisticated form of burden sharing. If it is a tax, is it a form of "international income tax" imposed by an international government (the European Union) upon the nations that delegated taxation authority to it (the member nations)? Moreover, does it provide any insight for possible innovations in international environmental finance? These questions are not answered in the present paper.

Sovereign International Taxes

The "purest" form of international taxation would consist of a tax imposed by a sovereign international government under sovereignty surrendered or relinquished to it by national governments. A scenario of such a tax might be viewed in the context of a world federation in which a sovereign, multifunctional, world government co-exists alongside the multifunctional sovereign nations of the world. Under another scenario, the nations of the world could surrender sovereignty to a global, or regional, supranational government in a particular functional area such as the global atmosphere. To this point of time, the reluctance of nations to surrender sovereignty has resulted in a total absence of sovereign international government -- a situation that appears destined to persist in the foreseeable future. Accordingly, the concept of "*sovereign* international taxation" is useful only as a benchmark for the present discussion or as a prototype for possible use in some future age.

However, this does not follow the ability-to-pay principle in "strict" terms since population (per capita GNP) is not used as a factor in the calculation of a nation's fourth resource payment.

III. INTERNATIONAL ENVIRONMENTAL TAXES: PERFORMANCE AND POLITICAL ACCEPTABILITY

As demonstrated in the previous section, the focal point for the development of innovative international environmental finance centers upon two instruments of international taxation that allow for the automatic generation of revenues: *harmonized national taxes* and *nonsovereign international taxes*. Between the two, harmonized national taxes hold the political advantage of constituting only a partial delegation of national sovereignty since the nations themselves impose the taxes. On the other hand, the nonsovereign international tax, though involving a complete delegation (but not surrender) of sovereignty since a supranational body imposes the tax, carries a higher probability for tax uniformity since the coordination of nationally-levied taxes is unnecessary. However, much of this potential disadvantage of harmonized national taxes could be overcome if the harmonization procedures are tightly-coupled or cohesive (Sandler and Cauley, 1980). Meanwhile, both instruments allow for home-nation retention of tax revenues, but the harmonization instrument does so in a more direct fashion.

An Evaluation of Three Innovative International Environmental Taxes

The analysis now turns to a consideration of three innovative international taxes that have been proposed for use in international environmental policy.[12] Each of the taxes could be imposed under either the harmonized national taxes or nonsovereign international tax format. They are the (1) international foreign exchange transactions tax; (2) international air transport tax, and (3) international carbon tax. The taxes will be evaluated in relationship to the following performance criteria: (i) *revenue generation potential*, a factor that varies between the taxes despite the fact that all three would "automatically" generate revenues; (ii) *efficiency* in terms of relative price effects that directly reduce environmental damage, and (iii) *distributional equity or fairness* in relationship to the ability-to-pay principle. Later in this section, the highly important criterion of *political acceptability* will be applied not only to these three taxes, but also in a more comprehensive context inclusive of nontax fiscal instruments such as financial transfers and trust funds.

International Foreign Exchange Transactions Tax: This tax was first proposed by James Tobin, the concept later becoming known as the "Tobin tax" (Tobin,

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[12]See Steinberg and Yager (1978) and Mendez (1992) for discussions of other possible international taxes. Also, see Brandt Commission (1980).

1978, 1991; Felix, 1995; CSD, 1996). The tax base would be the money value[13] of individual foreign exchange transactions inclusive of futures contracts and options. The base would be uniform across nations. The tax rate would be proportional (flat). A positive relative price (efficiency) feature "anticipated" for the tax, but one that is unrelated to environmental problems, would be a reduction in speculation in foreign exchange markets. Meanwhile, The revenue potential of an international foreign exchange transactions tax is very large. For example, a one percent tax would raise some $10 billion per day, or $2.6 trillion per year assuming 260 working days per year (Mendez, 1993).

Ideally, the tax would be global in scope. However, since most foreign exchange transactions occur in a few nations[14], a tax that only includes these nations might be effective. In fact, if a subset of major industrial nations agreed to levy the tax, the desired revenue and market (relative price change) effects would be largely accomplished though, as observed above, the latter are of a nonenvironmental nature. The fairness of the tax, in ability-to-pay terms, is a complex issue and no definitive studies exist to shed light upon this point. However, an a priori argument might be made that, since taking part in foreign exchange transactions activities tends to be directly related to a person's income, the tax would be "progressive" and, thus, in keeping with the normative fairness prescription of the ability-to-pay principle. Meanwhile, either a harmonized national tax or nonsovereign international tax format could be employed for the implementation of an international foreign exchange transactions tax regime.

International Air Transport Tax: This proposal calls for the imposition of an excise tax on commercial air transportation, both passengers and freight, between the nations of the world (CSD, 1995; ICAO, 1996). The tax rate levied upon this tax base would be flat or proportional. It also would be uniform across nations in order not to distort the market for air transportation between nations. A choice would need to be made between the use of either an ad valorem tax base, that is, the money value of passenger tickets and freight, or a specific base consisting of each passenger or freight transaction. While the latter would appear to be feasible for air passenger transportation, it would be more problematical for freight transportation due to the considerable disparities between freight

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[13]**Conceivably, the tax base could be specific rather than ad valorem, that is, it could be levied on each transactions as it occurs apart from the value of the transaction.**

[14]**Kaul (1996) estimates that 85 percent of the tax revenues would be generated in nine nations.**

shipments as to their size and value. The tax could also be levied upon the fuel used for the aircraft involved in international air transport.

An international air transportation excise tax would create positive environmental price effects (relative price changes) since the higher prices of such transportation would tend to reduce its output and, hence, the air and noise pollution that accompanies such transportation.[15] However, the improvement in the global warming problem stemming from air transportation itself would be infinitesimal as compared to the overall carbon emissions caused by the worldwide consumption of fossil fuels in the production of energy. Yet, as compared to the international foreign exchange transactions tax proposal, there is at least a positive environmental effect while the latter is neutral in terms of the environment.

The revenue generation potential for an international air transportation tax is rather small since the tax base, passenger and freight transportation between nations or aviation fuel, is small. Revenues from the tax could either flow to a trust fund and/or to a general supranational government budget in association with environmental goals. In terms of fairness, an international air transport tax on "passengers" would appear to be progressive, in ability-to-pay terms, since higher income persons are more likely to engage in international air travel than those of lower income. However, the ability-to-pay (distributional equity) performance of a tax on "freight" is more complex and there are no definitive studies upon which to base a conclusion. The tax could either be imposed by nations and harmonized under an international agreement or levied by a nonsovereign supranational entity.

International Carbon Tax: This proposed tax has received considerable attention during recent years (Weimer, 1990; Pearce, 1991; Cnossen and Vollebergh, 1992; Herber, 1992). The tax base would be the market transactions in which the fossil fuels -- coal, oil, and natural gas -- are acquired for the production of energy. It would be defined in terms of the physical units of fossil fuels sold in the market. The tax rates would vary in accordance with the carbon content of each fossil fuel and, thus, would be highest on coal, next highest on oil, and lowest on natural gas. The tax would enter the prices of these fuels via a Pigovian excise tax format. The higher prices would discourage the use of fossil fuels, especially those with the greatest carbon content, while encouraging the substitution of nonfossil energy sources such as geothermal, nuclear, solar, water,

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[15]The price elasticities of demand for international passenger and freight air transportation would determine the final reduction in air and noise pollution.

and wind power. The actual rates required to meet a particular carbon abatement goal would be a function of the price elasticities of demand for each fossil fuel, the cross-price elasticities of demand between the different fossil fuels, and the cross-price elasticities of demand between fossil fuels and nonfossil fuels.

Thus, even if an international carbon tax generated little revenue, it would enhance economic efficiency via relative price changes. However, its revenue potential is extremely large since its potential tax base is the aggregate global volume of energy transactions involving coal, oil, and natural gas. Even a very low tax rate would yield substantial revenues though, in the long run, revenue generation would tend to decline as higher fossil fuel prices encourage the substitution of nonfossil fuel energy sources for fossil fuels. In terms of fairness, an international carbon tax would be "regressive" to income since energy is a necessity good that takes a higher proportion of the budgets of lower-income persons than it does of higher-income purposes. Yet, as with any tax, the fairness issue may be addressed via the *uses* of the revenues obtained from the tax. There are various ways that supranational expenditures financed from carbon tax revenues may be designed so as to be "progressive" to income -- thus, neutralizing the regressivity of the tax itself.

The same two institutional arrangements for the imposition of an international carbon tax emerge as with the proposed international foreign exchange transactions and international air transport taxes: (i) carbon taxes levied by national governments that would be harmonized across nations via an international agreement, and (ii) a carbon tax levied by a nonsovereign supranational body under authority delegated to it by the nations signatory to an international agreement. Regardless of the implementation format, a "global" carbon tax inclusive of all nations would be optimal since the atmosphere is a global common property resource. However, an alternative, second-best, scenario capable of yielding substantial efficiency and revenue benefits could take the form of a carbon tax agreed upon by a "subset" of major industrial nations. For example, if a carbon tax were imposed by those nations which hold membership in the Organization for Economic Cooperation and Development (OECD), a high proportion of global carbon emissions would be subject to the tax. In fact, one might view an "OECD carbon tax" as one that expands the European Community carbon tax proposal of 1991 (Herber and Raga, 1995) to include the United States, Japan, and other non-European industrial nations.

Performance Comparison of the Three Taxes: Among the proposed taxes, the international carbon and foreign exchange transactions taxes would generate the most revenues. By contrast, the tax base of the international air transport tax is

much smaller and, accordingly, would generate far fewer revenues. On the other hand, the smaller impact of the latter on economic activity could mean less political resistance to its adoption. However, all three taxes, since they are indirect and impersonal sales (excise) taxes, would tend to be politically more acceptable than tax instruments that would use the personal income or wealth of a nation's citizens as the tax base.

In terms of environmental efficiency performance, the largest efficiency gains would come from an international carbon tax through its substantial relative price effects that would result in a reduction in the use of carbon-emitting fossil fuels. By contrast, a tax on foreign exchange transactions exerts no relative price changes of an environmental nature while those relative price effects exerted by the international air transport tax would be very small in comparison to the efficiency gains of a carbon tax. In fairness terms, the international carbon tax is "regressive" to income, the international foreign exchange transactions tax is "progressive" to income, while the distributional equity performance of an international air transport tax appears to be "progressive" in terms of its passenger base and uncertain in terms of its freight base. In all instances, expenditure programs financed by the tax revenues can be designed to reduce regressivity and/or to increase progressivity.

International Environmental Expenditures and Trust Funds

While the preceding discussion has emphasized the search for innovative instruments for "financing" global environmental objectives as embodied in Agenda 21, the present discussion will focus upon the "uses" of the revenues that would be generated from such improved financing sources. For example, revenues produced by innovative new taxes could be earmarked for a trust fund or trust funds to finance a variety of expenditures and transfers linked to the alleviation of the climate change or other global environmental problems. For example, revenues could be used for payments to developing nations for conserving rain forests (see Figure 1 in Section I), and/or to fund financial transfers from high-carbon emitting to low-carbon emitting nations based upon a distributional formula, and/or to finance subsidies for the development of nonfossil fuel energy sources. The manner in which the tax revenues are distributed will bear importantly upon the political acceptability of any policy regime seeking to reconcile relevant efficiency and equity goals.

One scenario for new international environmental tax revenues is to use them to expand the funding and policy role of the *Global Environment Facility*. GEF is currently the most comprehensive global environment agency, even

though its existence is confined to only the present decade. As observed in Section II, its mandated policy areas are extensive (global warming, ozone depletion, oceans and international waters, and biological diversity) and it has been named the interim financial mechanism for the Framework Convention on Climate Change and the Convention on Biological Diversity. It also helps to administer the Multilateral Fund of the Montreal Protocol for the protection of the ozone layer. However, the present funding for GEF is reliant upon the unstable and unsophisticated burden sharing instrument.

In the meantime, if one wishes to look well into the future and postulate an optimal arrangement for financing effective global environmental policies, the concept of a *Global Commons Trust Fund* may be discussed (Brundtland Commission, 1987; Stone, 1989, 1990; Mendez, 1992). The policy challenge at hand is to manage the global commons in such a way so as to attain their efficient economic use despite the absence of explicit national or global[16] property rights to these natural resources. Even though the commons have economic value, it is difficult to price this value in the absence of such rights. Under the trust fund concept, taxes or charges would be imposed on access to the commons, with revenues earmarked for an environmental trust fund or funds whose expenditures would help restore the commons from past damage and help develop technologies that would make the future use of the commons more efficient.

The proposed taxes or charges would be levied upon such uses of the commons as fishing in international waters; offshore oil and gas production; the use of the oceans for the dumping of wastes; carbon and ozone-depleting chemical emissions into the atmosphere; deep seabed mining; various uses of space such as parking fees for geostationary communications satellites, and tourism in Antarctica. One might even theorize that the Global Environment Facility could serve as the umbrella agency for a consortium of international environmental agreements to implement such a futuristic policy regime. However, whether one is looking at more immediate solutions or the long run notion of a Global Commons Trust Fund, ways must be found to make the concept of international taxation more acceptable to the nations of the world.

Some effort has been made during recent decades to establish global property rights to the global commons in the form of the common heritage principle.

The Bottom Line: Making International Environmental Taxes Politically More Acceptable

What dimensions should international environmental tax and other fiscal instruments exhibit in order to fit into the mold of *least political resistance*? Since an absolute transfer of sovereignty to a supranational body is unthinkable to the 200 sovereign nations constituting the global public sector, the sovereign international tax instrument must be rejected. Meanwhile, since individual nation self financing of their own international activities denies the possibility of centralized supranational finance, this much-used technique must be rejected as a fundamental financial approach. Moreover, burden sharing cannot automatically generate revenues and, thus, cannot be defended as an effective financial instrument. This leaves *harmonized national taxes* and the *sovereign international tax* as the only available instruments that meet the fundamental requirements of "revenue automaticity" and "political acceptability." The concluding portion of the paper will now suggest a set of criteria for the *least political resistance* by nations to the adoption of effective international tax and fiscal instruments for the financing of sustainable economic development.

The first, and most fundamental, of these recommended criteria is that nations retain as much of their sovereign taxation powers as possible in the selection of a tax regime. Since an outright surrender of such authority has been dismissed as infeasible, we are talking about the *minimum delegation of taxation authority*. The "harmonization of national taxes" via an international agreement results in the least possible delegation of sovereignty while, at the same time, achieving the automatic generation of tax revenues. Nations levy the tax under this approach; a supranational authority does not levy it.

The primary alternative to this instrument is the "nonsovereign international tax." Although it does involve a partial delegation of national taxation authority since a supranational body levies the tax, this is done "voluntarily" and, if they wish, the signatory nations can abrogate the agreement and recover these delegated powers at any time. Moreover, as observed above, a directly imposed nonsovereign international tax possesses an advantage over harmonized national taxes in the area of tax rate and tax base uniformity across nations. A compromise between the conflicting "minimum sovereignty delegation" and "tax uniformity" goals may be provided by an arrangement whereby nations collect a nonsovereign international tax through their domestic tax administration systems, and receive some of the revenues for their tax collection efforts.

The European Union tax model, as described in Section II, provides excellent examples of the use of both the harmonized national tax and nonsovereign international tax instruments. While these taxes are not for environmental purposes, they may serve as a useful benchmark for the design of international environmental taxes. The *value-added taxes* of the member nations of the Community were harmonized initially to help attain the common market goal and, subsequently, have become the primary sources of revenue for both the member nations themselves and the European Union government. The uniform *customs duties* on goods and the *agricultural levies* on commodities imported into member nations from the rest of the world exemplify effective use of the nonsovereign international tax approach. Moreover, each nation is allowed to keep 10 percent of the revenues derived from the value-added taxes, customs duties, and agricultural levies as payment for collecting the taxes. The overall use of these tax instruments involves a modest delegation of sovereignty by the member nations and an effective blend of both national and international revenues. Meanwhile, the International Oil Pollution Compensation Fund (see Section II) offers an example of a successful nonsovereign international tax.

A second suggested criterion for the political acceptance of international environmental taxes is that *nations retain some of the revenues* yielded by the tax. Harmonized national taxes provide a direct opportunity for home-nation revenue retention. Moreover, a nonsovereign international tax regime may be designed so that it will return some portion of the revenues to the "source nation" for individual nation segments of the supranational tax base. The taxpayers of a nation are more likely to approve a tax regime that will yield revenues for their own use.

The feasibility of home-nation revenue retention will be influenced by the goals of a tax regime (Section II). For example, if the primary purpose of a tax is that of "efficiency" in the form of relative price changes that reduce negative environmental externalities, the retention of a significant portion of the tax revenues by a home nation would not tend to be a problem since the efficiency gains would be forthcoming in any event. However, if the tax is primarily a general revenue tax to finance centralized international environmental expenditures, a direct tradeoff will exist between revenues for this supranational purpose and the ability of a nation to keep tax revenues. Nonetheless, a compromise is possible whereby some of the tax revenues could go for supranational expenditures with the remainder going to nations, thus enhancing political acceptance while allowing for substantial supranational spending as well. The design of a supranational tax regime that allows substantial revenue retention by nations is well exemplified by the harmonized value-added tax of the

European Union. Member nations under this mechanism retain access to 98.6 percent of a nation's value-added tax base while the European Union has access to the remaining 1.4 percent of the tax base.

A third criterion for the political acceptance by nations of an international environmental tax regime is offered by the opportunity, in some instances, for a *linkage of the tax instrument* to a *supranational trust fund* or other *centralized expenditure* arrangement. When this opportunity exists, the domestic principles of fiscal federalism help to improve the performance of the international environmental regime. Trust funds may be used as a vehicle for financial transfers between nations in pursuit of equity (fairness) or efficiency objectives. While present international environmental trust funds may be found in such institutions as the Global Environment Facility and the Multilateral Fund of the Montreal Protocol, they are financed by the unreliable burden sharing instrument. If such trust funds could be financed, instead, by taxes that automatically generate revenues, the performance of such funds would undoubtedly increase. The effective tax-financed performance of the International Oil Pollution Compensation Fund is a case in point.

Furthermore, it is suggested that an *eclectic* environmental policy format will be politically more attractive to the acceptance by nations of an international tax than would a single or unitary tax regime that places "exclusive emphasis" on a generically unpopular phenomenon (taxation) as well as an encroachment upon national political sovereignty. Thus, an international tax is more likely to be accepted by the citizens of a nation if it is part of a comprehensive policy format inclusive of other policy tools. The policy mix might include both economic and noneconomic or regulatory instruments and, within the economic component, both fiscal and market tools. A good example of the latter, in terms of the global warming problem, would be an international market for trading emission permits that would accompany an international carbon tax.

The International Oil Pollution Compensation Fund provides an excellent example of an eclectic environmental regime. This comprehensive approach includes a "regulatory" feature -- compulsory insurance by shipowners; a nonfiscal "market" component -- the purchase of this insurance in a private market by shipowners; an "international tax instrument" -- the Pigovian excise tax paid by receivers (importers) of oil into a nation, and the use of the tax revenues for compensation and indemnification purposes via a "trust fund" -- the IOPC Fund. Moreover, since the tax is "supplemental" to the compensation revenues provided by the insurance mechanism, it is not the focal point of the policy regime. Furthermore, its semantical description as a "contribution" rather than a

"tax" may subtly contribute to its acceptance. In any case, it is an effective instrument for helping to achieve the overall policy goals of the regime.

Another suggested criterion for political feasibility is that international environmental tax instruments be introduced in an *evolutionary* or *gradual* manner. This feature is complementary to the "eclectic" criterion above in that newly adopted tax instruments would be part of a comprehensive regime inclusive of such existing environmental finance instruments as burden sharing as well as broader purpose instruments such as Official Development Assistance. As circumstances permit, international tax and fiscal instruments could be gradually increased in importance relative to the other policy tools. Moreover, tax instruments possess a generic flexibility in that tax rates may be changed as parameters such as political attitudes and scientific information change. The flexibility point is exemplified in the annual rate variation of the excise tax that finances the International Oil Pollution Compensation Fund, which tax is a function of the magnitude of recent oil spills and the compensation payments and indemnification payments related thereto.

The *efficiency* advantages of an environmental tax such as a Pigovian excise tax may also be used as a "selling point" for its political acceptance. This may be especially attractive if combined with the so-called "double dividend" argument. Thus, a Pigovian excise tax, first, may contribute to efficiency via a reduction in negative environmental externalities and, by using the revenues yielded by the tax to replace revenues from existing, more inefficient, taxes such as those on wage and salary income, a second efficiency effect may also be forthcoming (Goulder, 1994). The double-dividend argument is compatible with a "revenue neutrality" requirement whereby the tax revenues derived from an environmental tax cannot increase total governmental revenues (and expenditures) since they must be used to replace an equal amount of revenues from existing taxes -- adding to the political attractiveness of the tax regime.

The nature of the tax base is also relevant to the political attractiveness of a tax. Thus, generally speaking, an indirect and impersonal *sales tax* tends to be more acceptable than taxes which directly tax the personal income or wealth of a nation's citizens. In particular, an *excise* form of sales tax minimizes tax opposition since it is narrowbased and, thus, focuses upon market transactions for a specific economic good or resource rather than a wide base of commodities. Nonetheless, if the tax base consists of specific goods or resources of a highly necessitous nature such as fossil fuels used in the production of energy (an international carbon tax), the tax may still face substantial political opposition and require justification on other, more compelling, grounds such as economic

efficiency. Meanwhile, under some circumstances, a subset of strategic nations may be able to "lead the way" in the adoption and implementation of an effective international environmental tax regime such as a carbon tax.

While all of the above criteria for the political acceptance of international environmental taxes may be defended on analytical grounds, they cannot substitute for a *global political recognition* of the "need" for effective policy instruments, both tax and nontax, to address global environmental problems. However, the "smoking gun" of an ozone hole over Antarctica will not always be available as a catalyst such as was the case for the Montreal Protocol. Instead, most global environmental problems are more subtle in nature, though certainly not of less importance if sustainable economic development is to be attained.

The following words of Thomas Jefferson inscribed upon his Memorial in Washington, D.C. seem appropriate to the present global environmental situation and the need for innovative international tax instruments to help finance Agenda 21:

> I am not an advocate for frequent changes in laws and constitutions. But laws and institutions must go hand in hand with the progress of the mind. As that becomes more developed, more enlightened, as new discoveries are made, new truths discovered and manners and opinion change, with the change of circumstances, institutions must advance also to keep pace with the times.

Perhaps, the time has come for an enlightened use of international environmental taxation!

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