

Constraints to the Use of Economic Instruments

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Brazil's Green Value-Added Tax

Revenue from the state valued-added tax (ICMS) is distributed among municipalities according to origin, generation, and population criteria. Since 1992, three Brazilian states—São Paulo, Rio de Janeiro, and Paraná—have introduced environmental revenue distribution criteria based on the size of area subject to land use restrictions (watershed and conservation protection). The main aim was to create a budgetary supplement to compensate municipalities where land use restrictions, which benefited society as a whole, might impose barriers to local economic development. An advantage of the scheme is that it did not require a new fiscal instrument. Moreover, it is expected that additional financial resources can also promote implementation of sustainable activities.

Introduction of the environmental criteria was carried out with a careful political approach involving mayors and representatives in the state congress. Because total tax revenue did not change and therefore the new criteria reduced the share of other municipalities, political resistance was acknowledged. Studies were undertaken to estimate budgetary impacts on municipalities where gains and losses were expected. As a first step it was agreed that a very small share of total revenue (between 0.2 and 3.0 percent) would be devoted to these criteria. Nevertheless, legislation allows for periodic revisions to the criteria, indicators, and shares based on the results. These revisions have in fact occurred in São Paulo and Paraná, where the system has already been in place for about three years. Major changes announced so far are restricted to redesigning indicators where monitoring difficulties have been encountered.

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

Tradable Water Permits in Chile

The Chilean experience with tradable water permits dates to the 1920s. The general legal basis was, however, set in the 1951 water code that allows the state to give water concessions to private parties according to water use priorities. Water transfers were allowed provided that use remained the same. Water then became state property and trade concessions were prohibited in 1969, during the agrarian reforms, but permanent water rights were reintroduced by the new 1981 water code, which were completely separated from land rights and could be freely traded for consumptive and non-consumptive uses.

This system actually yields very little amount of transaction (records in 1992 showed that only 3 percent of total water flow was traded in the area of Santiago, where trade is more intense, and that trade between urban users and farmers did not

exceed 3 percent of total trade transactions, thus involving no change in beneficial use). However, the tradable permits system have been reported to have avoided political disputes and reduced investment expenditures. Chilean long tradition in water property rights is alleged to explain the political acceptance and effective enforcement of tradable water rights. Even water rights that are not legally registered (involving more than half of the water users) are respected and traded.

The lesson from this is clear: assurance and acceptance of property rights are particularly important for trading (or even taxing) water rights. Controversial equity issues are bound to arise for this essential natural resource and countries with no similar tradition should first legalize existing titles for property rights and define criteria for new allocations. The water permits already in place in many countries may provide an initial endowment.

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

Tradable Transportation License in Santiago, Chile

A successful road-auctioning system for bus transportation licenses has been implemented in Santiago to address pollution from traffic congestion. The key element of this success is the use of an existing licensing system to introduce the economic incentive. It thus benefited from lower transaction costs, a fairly high level of revenue generation, and few legal and institutional barriers. As for the result in terms of pollution reduction, actual emission reductions have not been measured and may result very hard to assess as air pollution have many other sources. However, it has been reported that congestion has apparently been reduced by the measures, thus implying that emissions have been reduced proportionately.

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

EPA's Emission Trading Program in the USA

Beginning in 1974, the US Environmental Protection Agency (EPA) experimented with "emissions trading" as part of the Clean Air Act's program for improving local air quality through the control of volatile organic compounds (VOCs), CO, SO₂, particulates, and NO_x. Firms that reduced emissions below the level required by law received "credits" usable against higher emissions elsewhere. Companies could employ the concepts of "netting" or "bubbles" to trade emissions reductions among sources within the firm, so long as total, combined emissions did not exceed an aggregate limit. The "offset" program, which began in 1976, went further in allowing firms to trade

emission credits and compelling firms wishing to establish new sources in areas that are not in compliance with ambient standards to offset their new emissions by reducing existing emissions.

The problem with EPA's Emissions Trading Program was that relative baselines were used to calculate reduction levels, which created significant transaction costs by essentially requiring prior approval of trades as the authority investigates the claimed counterfactual from which reductions are calculated and credits generated. The reason is that relative baselines implies that reductions must be credited relative to an unobservable hypothetical—what the source would have emitted in the absence of the regulation- which considerably increases the cost of monitoring. The experience advocates for the use of *absolute* –rather than *relative*- baselines

Source: "Experience with Market-Based Environmental Policy Instruments", Stavins, 2000

Land Privatization in Botswana (1999)

Privatization may occur de-facto without a formal change in land tenure or de-jure through a change in land tenure. For Botswana, it is estimated that 45% of the communal rangelands are now de-facto controlled by individual livestock owners or by small groups.

Aim Land privatization is used as a tool to boost agricultural development and sometimes to improve land management. In the latter case, the intention is to bring the land costs closer to the MOC by internalizing environmental costs and foregone benefits.

Environmental effectiveness In spite of the expectations, the environmental effectiveness of land privatization has been low. This may be attributed to at least five factors: 1) Existence of escape routes to communal areas for ranchers (so-called *dual grazing rights*), so that ranchers do not have to internalize environmental effects. 2) Other management constraints prevent improved land and livestock management, such as absentee management, access to credit, skills etc. 3) Market absence and/or imperfections due to government control and land scarcity, which led to land speculation and a failure to reflect land quality in the land value. 4) While environmental problems related to open access of resources may be solved, those associated with market failures may increase. 5) Speculators and marginal farmers continue their practices, consequently the land value is not properly perceived.

Efficiency Land privatization is a relatively cheap instrument, involving land demarcation and allocation. Inefficiencies however occur in three instances: 1) Poor preparatory work may cause high costs for land owners and government. This happened especially where livestock ranches were initially allocated without groundwater exploration. As a result, farmers and government experienced high costs

of drilling blanks. 2) Under-utilization of commercial land. 3) Subsidies and private land lead to sub-optimal land use and production.

Equity While land privatization benefits the high-income group, who can afford to invest in land and benefit from agricultural subsidies, privatization of communal land implies that non-owners, usually the low-income groups, lose access to land and land-based resources.

Flexibility Land privatization is difficult to reverse and de-facto inflexible. The flexibility could be improved by imposing and implementing conditions to leases both in terms of development and land management

Source: "Economic Instruments and the Southern African Environment: Synthesis of Experiences of five SADC Countries", Jaap Arntzen, 1999

Land Charges/Taxes in Botswana (1999)

Land charges increase the opportunity cost of land, thus giving an incentive for better land management and sale. The environmental effects depend on the destination of the tax revenues. If they are re-invested in communal and commercial land management, the effects can be positive. On the other hand, higher production costs may stimulate over-utilization of land.

Environmental effectiveness User charges tend to be effective only if they are sufficiently high, which is not the case in Botswana. Land rents set by government in 1975 at an extremely low level (1\$/ha) have never been adjusted, hence they are badly eroded by inflation. Consequently, there is little incentive to improve land management.

Efficiency Botswana's fees are inefficient. The costs of fee collection frequently exceed the benefits. Moreover, low fees attract land speculators and keep marginal producers alive, therefore discouraging proper land use and productivity.

Acceptability Economic land charges are difficult to accept for farmers. Politicians resist them because of self-interest and/or strong farmers' lobbies.

Flexibility Although the instrument is theoretically flexible, it is much less flexible than revenues set by tendering because reviews of market conditions and inflation rarely take place in Botswana.

Source: "Economic Instruments and the Southern African Environment: Synthesis of Experiences of five SADC Countries", Jaap Arntzen, 1999

Emission Trading in the Bâle Region, Switzerland

The Bâle region incorporated the trading of emissions in environmental legislation in early 1993, launching a market for emissions of nitrogen dioxide and volatile organic compounds (VOCs). The experiment was reported not to have yielded the hoped-for results in 1999, as very little trading had taken place. One of the explanations given to this low level of exchange is the fact that only large plants belonging to the chemical or pharmaceutical industries have stationary sources emitting enough VOCs to participate in trading, as a minimal level of emission (at least 5 tons per year) had been set up, which prevents small emitters to get involved in the trading system. Unfortunately, those large plants had already made major efforts to reduce their emissions as a response to previous environmental regulations, and have very high marginal abatement costs today. This gives very little room to further abatement from those firms, and therefore results in the low amount of trade on the emission market. On the contrary, up to now smaller sources have not been affected

by clean air measures yet, and usually have lower abatement costs than in the chemical sector, which could enable a large number of transactions if they were allowed to commit in the market.

Source: "Implementing Domestic Tradable Permits for Environmental Protection", OECD, 1999

Quotas and Quota Fees in the Fishery Sector in South Africa (1999)

South Africa has moved towards a market-based approach by introducing the use of individual transferable quotas (ITQs) under the Marine Resources Bill 1997. Quota revenues generally accrue to central government and are not reserved for resource management. The exception is a small levy for the Sea Fisheries Fund, which primarily funds research.

Environmental effectiveness Quota fees in combination with quotas have had a limited effect on fishing resources. While some species have recovered, others are still in decline. Several reasons exist for the mixed results. First, policies have focused on quota and neglected to address the existing over-capacity, which has put enormous pressure on the resource through illegal fishing and lobbying aimed to increase the Total Admissible Catches (TACs) beyond the level of resource sustainability. Second, vessel ownership is linked to the fish processing industry in order to secure a reliable resource supply for the processing industry. This has contributed to illegal fishing by those with quotas. Third, quota fees are low and do not reflect the MOC. Higher fees could be used to finance monitoring, enforcement and compensatory measures to resolve the existing over-capacity.

Equity Historically, the quota system has been used to promote the interests of large commercially, mostly white-controlled fishing companies. Black (co)-ownership of commercial companies and larger quota to communities are slowly redressing this inequality. ITQs can be more equitable, but the distributional effects depend on the ultimate quota allocation mechanisms. For instance, the government of South Africa has ensured that a larger share of the quota benefits domestic fishermen and companies with deep-sea trawl fishing, where the harvest share of foreign vessels has declined from over 60% in 1972 to a negligible part now.

Acceptability Stringent regulations are always hard to accept for resource users, particularly if they have over-invested and if they have been introduced by colonial or apartheid regimes. Therefore, the network of regulations is disputed and corruption and bribes occur to circumvent it. However, there is widespread acceptance that the resource and the industry need to be protected from collapse. The ITQs may be more acceptable as these offer transfer possibilities and distribute rights more equally.

Flexibility Quota fees and quotas themselves are flexible, and can easily be adjusted. In practice, quotas are regularly reviewed based on resource conditions; quota

fees are not regularly adjusted and as a result lose their resource value because of inflation.

Source: "Economic Instruments and the Southern African Environment: Synthesis of Experiences of five SADC Countries", Jaap Arntzen, 1999

Emission Charges on Air Pollution from Large and Medium Sources in the Czech Republic (2000)

Calculation of the charge is based on the amount of certain pollutants emitted and the unit rate for each substance. The charge levied are based on self-reporting by the polluters, but under the controlling role of the environmental agencies.

Aim The designated aim is to provide economic incentives for air polluters to take pollution reduction measures and to provide revenue which enables financial support for activities which improve the environment. But in practice revenue raising is the main function. The charge has been in force since January 1, 1992.

Subject The charge is levied on waste water effluent from households, companies and institutions.

Use of Revenue The revenue goes to the State Environmental Fund (SEF) and is used to finance programmes related to air pollution.

Effectiveness The basic rates of these charges are several times lower than the estimates of average abatement costs. Therefore, the charges play a primarily financing role. The administrative cost of collecting the charges has been criticized for being quite high.

Perspectives To create effective incentives, it is necessary to prepare an amendment to Law 389/91 Coll which would 1) prepare new and higher rates; 2) reduce the number of pollutants presently covered(almost 90); 3) make a decision regarding the possibility of further decentralization of certain charges (the possibility of regional differentiation of charges according to the ambient air quality goals is also being considered).

Source: "Sourcebook on Economic Instruments in Environmental Policy in CEEC", the Regional Environmental Center, 1999

User Charge on Sewage and Sewage Treatment in Bulgaria (2000)

Aim A user charge is paid for the collection of effluent wastewaters and their treatment. For discharging effluent into the public sewerage systems a permit, issued by the competent authorities, is required. The revenue from the charge is used for covering the costs for sewerage and wastewater treatment. The legal background is the Territorial and Development and Construction Act, in force since 1973.

Subject The charge is levied on wastewater effluent from households, companies and institutions.

Use of Revenue The charges go directly to the state-owned water supply and sewerage companies or to municipal companies, which spend their income for maintenance of the sewerage and waste water treatment systems.

Effectiveness Due to gaps in the legislation, the current system is inefficient for imposing fees in case of delayed payment and for enforcing obligatory payment. Problems exist also concerning the property rights of infrastructure equipment due to gaps in the legislation, and there are no conditions for the private sector to come in.

Perspectives At present a new Water Act is being prepared, which is expected to solve the existing problems. It will be prepared according to the main principles of European Union legislation.

Source: "Sourcebook on Economic Instruments in Environmental Policy in CEEC", the Regional Environmental Center, 1999

Low Transaction Costs for Ozone-Depleting Chemicals Tradable Permits in the USA

As part of its implementation of the Montreal Protocol for control of ozone-depleting chemicals, the US Environment Protection Agency set up a system of fully tradable production quotas to phase-down the use of chlorofluorocarbons (CFC), halons and several other ozone-depleting substances. This program is considered a success, as trading has been substantial and as ozone-depleting substances production decreased more quickly than required under the Montreal Protocol. One of the reasons that explain the success of the program is that transaction costs have been low, because of several factors, including a relatively simple certification process for trades and the fact that the number of potential traders is small and they have experience in business dealings with each other. On the contrary, international trading of permits has been less active, because transaction costs are higher and actors have lower previous business experience between each other. This experience emphasizes the importance of previous relationships between actors potentially involved in a tradable permit system

Another factor that may account for the success of the program stems from the easiness of inter-pollutant trading. A large portion of savings from trading result not from differences in marginal costs or production across plants, but differences in the market value of different ODS.

Source: "Implementing Domestic Tradable Permits for Environmental Protection", OECD, 1999

Conflicting Market-Based Instruments and Political Priorities in Argentina

In 1980, Argentina attempted to introduce an industrial effluent discharge fee. The tariff included a fee for discharges within the maximum allowable level and a much higher penalty for discharges above the maximum allowable threshold. There were provisions for increasing the fee levels gradually over a 10-year period. The aim was to eventually set the fees at a level equivalent to abatement costs.

In practice the fees were never widely applied and the system was modified in 1989 to lower the fees and revise the penalties. Environmental groups sued the government on the grounds that the fee system amounted to a license to pollute beyond legal limits. The court declared the decree introducing the fees to be unconstitutional, and the issue remains unresolved in legal terms to this day. It appears that the court regarded the fee as exceeding the powers of the national government to levy taxes because it concluded that the fees could not be justified as a payment for service.

Source: "Selected Experiences with the Use of Economic Instruments for Pollution Control in Non-OECD Countries", von Amsberg, 1995, *quoted in* "Market-Based Instruments for Environmental Policy-Making in Latin America"

Emission Fees in China

The example of emission fees in China provides relevant illustrations of perverse incentives that were created because of an imperfect design. Enterprises are allowed to count most fee payments as production costs, therefore fees lower enterprises' tax liabilities in this system (a very important consideration given that tax rates on profits are on the order of 33%). Moreover, 80 percent of fee revenue are returned to enterprises and in many cases ends up being used for non-environmental purposes, because local environmental authorities simply do not have the resources or political will to closely enforce that these funds are invested in pollution control, as it is ostensibly alleged. Thus, the fee system actually creates incentives for enterprises to be out of compliance so that they can pay, if not overpay, fees. The fee system also creates perverse incentives for environmental authorities to perpetuate non-compliance: as they depend heavily on fee revenues for financial support, they, like firms, have strong incentives to maintain a steady flow of fee payments. Aware of these problems, in 1988 the state mandated that funds be returned to enterprises in the form of loans rather than grants. However, this rule has not been enforced, as environmental authorities are able to subvert it by exempting enterprises from repaying loans or by simply not enforcing repayment.

Source: "The Use of Economic Incentives in Developing Countries: Lessons from International Experience with Industrial Air Pollution", Blackman and Harrington, 1999

Lead Trading in the USA

During the 80s, restrictions to the use of lead additives in petrol were set up in the US, whose limits were tightened regularly, with the aim of reaching an entire elimination of leaded petrol. To ease the process of adjustment, especially among smaller suppliers, to these new stricter standards, a system of lead trading was instituted from 1983, to operate during the transition period to the new lower limit of 0.1 grams per gallon. Lead trading allowed refiners and importers to trade lead reduction credits in order to meet limits for the lead content of petrol. The lead reduction credits were to be created when suppliers of leaded petrol achieved lead levels lower than those required by the new limits. The system allowed for both internal "trading" (i.e. flexibility) for an individual supplier, as well as external trading between suppliers.

The general consensus is that this program has performed successfully. Among the alleged explanations are a clear definition of rights and obligations and of the timescale (the lead trading scheme was of explicitly limited duration, and this was fully understood by participants at the start of the scheme), the homogeneity and clear definition of the commodity traded and low transaction costs, due to the facts that no previous approval from the Environmental Agency was required for trade and that the personnel at different refineries were already accustomed to conducting transactions with each other, thus decreasing the costs linked to the search of information and transaction procedures.

Source: "Implementing Domestic Tradable Permits for Environmental Protection", OECD, 1999

The Shift From Cost-Recovery Approach to Environmental-Cost Approach for Water Charges in Colombia

In Colombia, water charges for effluent discharges and water use have been applied since 1974 by the regional environmental agencies. The very few applications of these charges were implemented with a cost-recovery approach attempting to cover the operating costs of monitoring systems. Failure to expand coverage and introduce pollution and usage criteria in determining charge levels occurred because of lack of appropriate design of the instrument, lack of information about impacts, incompatibility with the available monitoring system, and inadequate planning of its coverage. These factors have resulted in fierce public and political opposition and have undermined political support. As a result, only US\$116,000 were collected from a potential tariff revenue of US\$90 million. Interestingly, in the few cases where these constraints were overcome, it is reported that successful application of the charges induced changes in water use patterns as well as reductions in consumption and pollution.

In 1993 new environmental legislation (Law 99/93) eliminated the cost-recovery limitations of charges and clearly specified that pollution charges should be based on the criteria of full environmental costs. That is, the charge level must be defined according to the value of environmental services and the cost of environmental damages, therefore reaching the optimum level in the Pigouvian sense measured by economic welfare losses. However, these new rules made the constraints presented previously become far more severe: they demand a sophisticated institutional capacity, since the new charge determination is complex and bound to vary significantly with activity and spatial factors, and their administration can be extremely costly. In particular, 90 percent of the regional autonomous corporations declared that the technical requirements were too rigorous for them to implement. The resulting higher uncertainty in economic and social impacts also generated strong opposition among polluters and users.

Aware that the complexity of some proposed MBIs is exceeding domestic institutional capacity, the Colombian environmental agency is now attempting to streamline current legislation and regulations; charge levels are to be determined in stages where rates are gradually estimated and implemented. Moreover, attention has been paid to a careful analysis of economic and social impacts for future negotiations with polluters and users. The necessary adjustments for the existing institutional capacity vis-à-vis the charge system are also being considered.

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

Trash Collection funded through Earmarked Electricity Tax in Guayaquil, Ecuador:

An interesting example of solid waste management can be found in Guayaquil, Ecuador's largest city, where trash collection has been contracted out with some success. The municipality of Guayaquil asked for bids to haul garbage from the city to a landfill. The contract was awarded to a Canadian firm that is paid US\$9 per ton (the lowest bidding price by more than half) for garbage delivered to the state-of-the-art sanitary landfill. While they may lose money in the residential pickup areas, they are making money on the larger scale industrial pickup sites. Original estimates were that they would be delivering 1,200 tons per day when in fact they have been delivering 1,600 tons per day. The contract is up for review and renewal every five years, guaranteeing that they will serve the residential neighborhoods well. This represents an interesting incentive because the private-sector solid waste management company is paid by the ton to deliver garbage, thereby encouraging them to pick it up.

This system costs money, but regular and sufficient funding of solid waste management is provided in Ecuador through a 10 percent surcharge on electricity whose revenues are specifically earmarked to solid waste collection (this solution to cost recovery has been highly successful because electricity has the highest incidence of payment. Nonpayment is met with electricity cutoff and illegal hookups are quickly

found and disconnected.) As a result, whereas in other cities solid waste management is of poor quality and imposes a net cost, in Guayaquil the municipality may turn a profit, because deliveries multiplied by the US\$9 fee are *less than revenues from the 12 percent surcharge on electricity bills that finances solid waste collection and street cleaning.*

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

Removing Energy Subsidies vs. Pollution Charges in Russia:

A system of national emission charges was introduced in Russia in 1991. The charges, set at a very low level, are levied on over 300 air and water pollutants and a large number of stationary sources. Available capacities for reliable monitoring and inspection fall well short. Collection rates are moreover low, as polluters are able to exploit legal imperfections to evade payments, and many cases appear to contradict the legislation.

Another environmental policy in Russia is the removal of all pre-reform (1990) energy subsidies. Recent studies and observations in Russia show that such energy pricing policy aimed at removing macroeconomic subsidies results in larger emission reductions than MBIs introduced in the form of fees and taxes. Assessments have been carried out and showed that the removal of subsidies would generate a 16 percent reduction in SO₂ and a 14 percent reduction in CO₂; while the imposition of a pollution fee would reduce these emissions only 7 percent and 2 percent respectively.

The reasons for this are closely linked to the responsiveness of firms to changes (an economist would say: the higher elasticity) in subsidy patterns on the one hand, and to the ongoing need for adequate institutional capacity to implement a fee and tax system, which undermines the effectiveness of such a system, on the other hand.

Source: "Lessons from Cross-Country Experience with Pollution Charges.", Lvovsky, 1996, *quoted in* "Market-Based Instruments for Environmental Policy-Making in Latin America"

Voluntary Liability Agreement to Compensate for Oil Pollution in Trinidad-and-Tobago

Liability mechanisms to environmental management are simple instruments, which require only that legislation be in place that confers relatively straightforward rights and obligations to resource users (these approaches form a legal umbrella for court cases, which then consider the nature and extent of environmental damages on a case-by-case basis). However, as these approaches are relatively new, they have seen very limited application in developing countries because legal systems are themselves

weak in such countries. A way to overcome such a lack of legal capacity was implemented by Trinidad-and-Tobago, where voluntary liability mechanisms are strongly promoted. Such voluntary systems are informal ones and do not suffer the same problems as their formal counterpart. They can take advantage of social (peer group) pressures are likely to see broader success rates in a small-island context than they would in a larger country.

Voluntary mechanisms are of crucial interest in Trinidad-and-Tobago, as efficient enforcement and regulation in the country are impeded by the fact that the court system is heavily backlogged and constrained by inadequate financial resources. An example of a successful voluntary liability mechanism is provided by the oil sector: in 1990, PetroTrin established a voluntary policy of full compensation for environmental damages. The move was prompted by a number of uncontained well blowouts through the 1980s that damaged local homes, flooded farmers' fields with oil, and caused a significant public outcry in response to health damages when the company gave no assistance in relocating people to avoid the potentially lethal effects of the spills. After the voluntary policy was implemented, two notable trends happened: (a) blowout prevention devices on wells improved, making spills and leakage less frequent, and (b) when a spill did occur, it was easier to contain the impacts and any damages were readily compensated. An incident in the early 1990s, for example, required rapid evacuation of about 1,000 residents from a village when a blowout occurred; affected people were compensated for damaged land and inconvenience, and farms were restored at company expense.

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

Product Charge on Fuel for Transport in Hungary

Since 1997, the fuel charge in Hungary has been collected by tax inspectorates. Since 1998 it has been collected as a part of consumption tax and 3 percent of the tax goes to the CEPF. The result of such complicity of the administrative structure in the case of fuel charge is that its payment collection efficiency is the highest among product charges in Hungary (Hungary also applies product charges on solid waste, whose enforcement is committed to environmental inspectorates: in this case, enforcement is reported very difficult and collection efficiency is very low). The conclusion is that the closer the structure of product charges is to an excise tax, the closer the collection efficiency to the regular tax collection efficiency.

Source: "Sourcebook on Economic Instruments in Environmental Policy in CEEC", the Regional Environmental Center, 1999

Project of a Water Pollution Tax in Colombia:

Although the foreseen Water Pollution Tax was never implemented in Colombia because of legal disputes, the fear that it should be applied to the largest iron and steel plant in the country was sufficient to induce this plant to control pollution in order to avoid the charges it would have had to pay every year if the tax were implemented. This example emphasizes the effectiveness of a strong political will and credibility to induce environment-friendly behaviors among producers, even before the instrument has actually been implemented.

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

"People's Action" Law in Colombia:

Within the set of legal mechanisms that originated in the constitutional reform of 1991 in Colombia, such as the "Citizens' Rights Action" (Acción de Tutela), the "Compliance Action," and the "People's Action", the latter specifies that anyone who files a People's Action has the right to compensation of between 10 and 15 percent of the total value of the work necessary to correct the environmental damage caused. This creates a very strong incentive for citizens to suit non-compliant firms, which therefore represents a potentially powerful substitute to an ineffective administrative enforcement of environmental laws.

The effectiveness of these instruments has been proven in a short time: in three years there have been almost 300 "tutelas" (Citizens' Rights Actions) related to environmental disputes.

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

Air Pollution Permit Trading in Chile

A Chilean Decree introduced an implicit emissions trading system for fixed-source particulate emissions in the Santiago area. The system was based on emissions as reported in March 1992 and its implementation was committed to the Program for Fixed-Source Air Pollution Control (PROCEFF) within the National Environment Commission. The assignment of air pollution property rights was generally accepted by polluters: because of the free-market environment of the Chilean economy, the system's political acceptance was high and private companies were active in discussing standards and criteria. Moreover, PROCEFF has currently gained additional resources

and is training personnel in private laboratories, certifying the equipment and defining adequate technical procedures

In spite of these very positive factors, the whole system is undermined by a low credibility of the enforcement capacity, mainly due to sources of ineffectiveness that were present during the early stage of the implementation. Actually, the system implementation was delayed by PROCEFF's initially limited institutional capacity; private laboratories working with PROCEFF had been corrupted and some technical problems in measurements were also responsible for constant delays in enforcement. Because of this, the initial allocation of emissions was not well defined and the original law was considered insufficient to withstand legal challenges, which lead polluters to believe that only few of the provisions would be effectively enforced. In particular, companies can claim larger emissions for the March 1992 baseline date than had been previously reported, and the possibility of increasing the allocations retroactively thus reduces incentives for trading emission rights.

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

Subsidy on retorts in artisanal gold mining in Ecuador:

Taxing mercury in artisanal gold mining is somewhat ineffective because the demand for mercury from artisanal gold miners is quite inelastic, as mercury results in less than 1 percent of total costs to the miner. Thus, rather than heavily taxing mercury at its point of entry, policy makers in Ecuador have decided to promote the use of retorts to reduce mercury loss in the amalgamation process of artisanal gold mining, through offering an incentive to reduce the costs of the retort to the gold miner on the form of a subsidy. This is an example of subsidizing the cost of appropriate technology for environmental and health benefits. The cost of a retort is about equivalent to 1.5 grams of gold, but will provide a 5-10 percent improvement of capturing gold in the amalgamation process.

Source: "Market-Based Instruments for Environmental Policy-Making in Latin America"

The Persistence of Incentive-Insensitive Behaviors among Russian Newly Privatized Firms

The effectiveness of all market-based environmental policies in Russia has been seriously undermined by a series of sources of institutional inefficiencies, including lack of knowledge from civil servants and financial institutions, low enforcement capacity, lack of information about alternative technologies and low credibility (as the

federal level is widely distrusted). In addition to these reasons, the lack of reaction to market signals among Russian firms is frequently alleged to be one of the key sources of ineffectiveness of MBIs, though most of those firms are now privately run. The reason is that, in order to favor political acceptance, the Russian privatization program was primarily shaped to favor the "insiders" (ministries, plant managers, local authorities etc.), with no regard for economic efficiency issues, in such a way that many elements of the former centrally planned economy continue to exist. As a consequence, even though the societal model has changed in formal terms, in practice the basic structure of resource management remains virtually the same. In particular large enterprises, whose outputs are essential inputs to other sectors of the economy), can easily rely on their networks of personal contracts and mutual services and make claims on public funds. Soft-budget constraints, fixed prices, centrally granted investments, etc., thus still exist in important sectors of the national economy, and accordingly evidence of real changes in enterprise behavior is hard to find.

This example highlights the fact that the existence of a private sector is not a sufficient condition to insure that enterprises will react effectively to environmental economic incentives. In the case of formerly planned economies, real changes would require, in addition to privatization, *real* enterprise autonomy rather than simply a continuation of old bureaucratic networks between politicians and enterprises. A path to industrial restructuring and cleaner production methods might lie in the acquisition of state-of-the-art technologies from foreign incentive-sensitive firms, as foreign investments would have positive institutional impacts in the sense that foreign investors can, for instance, subject old managers to commercial rather than administrative standards, and improve quality control.

Source: "Environmental Policy in Transition Economies: The Effectiveness of Pollution Charges "by Patrik Söderholm, 1999

Introduction of an "Ozone seal" in Chile

In 1992, a programme was designed in Chile in the framework of the Montreal Protocol on Ozone depleting chemicals, including the project of an "ozone seal" ("sello ozono"). The "ozone seal" system was launched in 1995, and benefited sufficient funding and a large advertisement campaign that involved all media. However, it was recently assessed as a limited success, primarily because of the low distribution of seals (for instance, in 1999 only one firm acquired the ozone seal in the whole country). Among the reasons alleged to explain such relative failure are: a) many products that could have been eligible to an "ozone seal" were intended to firms, not to final consumers; b) consumers did not give specific attention to the "ozone seal", as it was only one of many other ecolabels; c) many firms used "transition substances", which were allowed as a step toward the elimination of ozone depleting chemicals, but impeded them from becoming eligible to the "ozone seal"; d) firms that wanted to be

awarded an "ozone seal" had to incur wide certification costs. It is worth noting that no institutional, legal or technical obstacle was met in this case: the obstacle encountered only come under the specific pattern of demand for certification (from firms) and for certified products (from consumers).

Source: "Desafíos y Propuestas para una implementación mas Efectiva de Instrumentos Económicos en la Gestión Ambiental de América Latina y el Caribe : El Caso Chileno", Cepal, 2000

Differential water user charges in Botswana

Water scarcity is a major issue in Botswana and, as poverty is still widespread, water supply systems need to be based on a balance of efficiency, sustainability and social justice. The principal economic instrument used in Botswana to manage water use is a differential user charge. A secondary instrument takes the form a subsidy to make potable water affordable to the entire population. Because of water scarcity, the production costs and transport costs are increasing and at the same time the government intends to reduce water subsidies. Current differences in charges are based on two factors: location and level of consumption. The expectation is that water charges will reduce the per capita water consumption rates, and therefore alleviate water scarcity. Realising that subsidies have the opposite impact, it is meant to reduce subsidies and to target the remaining subsidies to those most in need, for social reasons.

Water charges have contributed to the relatively low per capita water consumption, but their impact is more limited than foreseen. This is due in part to the continued subsidization of water supply which lowers the charges, and to other factors such as: income inequality and the prevalence of low incomes; the underdeveloped economic structure; inadequate access to water in remote areas. High water charges have had two positive impacts. Firstly, high water charges in conjunction with the government's unwillingness to subsidize irrigation have kept the irrigation sector small. Secondly, high water charges provide incentives for water-harvesting and water-saving practices and encourage reductions in the substantial losses in existing reticulation systems. Because of the minimal charges for low consumption levels, the policy has been successful in promoting social justice.

Water charges are not yet efficient, but their efficiency is increasing with the reduction and targeting of subsidies. Although water supply seems to be fair from an equity perspective, it is important that the reduction in subsidies should not affect the lowest income groups. Water consumers already perceive water charges as very high and higher charges would receive a hostile response from users. The administrative costs of the water charge are relatively low in areas with many private connections, though in rural areas these costs, including penalty procedures and reconnections, must be substantial.

In order to ensure sustainability of the nation's water resources, a comprehensive policy should be prepared covering all uses and users. A combination of instruments, legislative, economic and consultative ones, could produce the best results. For example, awareness campaigns and voluntary restrictions proved effective during the 1980s drought.

Source: "Promoting a sustainable water supply in Botswana" by J.W. Artzen, in Economic Instruments for Environmental Management: a Compendium of Case Studies, UNEP, 2000.

Wastewater effluent charge in Mexico

Water pollution is a major health hazard in Mexico and is estimated to cost about US\$ 3600 million. The Mexican government is using several economic instruments, in combination with control-oriented instruments, to effect changes in polluters' behaviour. The wastewater charge aims to enforce effluent standards and to induce firms to invest in measures to improve the quality of their wastewater. While the original 1991 charge was a non-compliance one, applied only when pollutant concentration levels exceeded standards, the 1995 revision turned the charge into a type of tax on all levels of pollutant concentration.

The new charge system is stricter than the previous one, as there are no longer exemptions for emissions below the standards, and the charge is no longer a non-compliance charge. This revision is significant in economic and environmental terms. Firstly, because it is a permanent incentive for users to reduce the volume and concentration of pollution; and secondly because the water body's assimilative capacity is now taken into account. However, other forms of charge exemption have been created: polluters with a monthly discharge of less than 3000m³ can chose to pay a fixed flat charge, and public water suppliers to municipalities with less than 2500 inhabitants are exempted.

Since 1997, the Federal Law of Charges allows the introduction of economic incentives for users of water receiving bodies, who have adopted processes for better water quality than that required by the standards. New official standards have been set, establishing the maximum permissible levels of pollutants for wastewater discharges to national waters and goods, and to sewerage. This represents an enormous simplification, since this new approach collapses the previous 43 official standards only in two. This change was driven by the large default among users, that was associated with the past economic crisis.

Although the potential charge revenue expected from the wastewater charge would provide the means to expand investments in pollution abatement measures in municipalities and firms, this may not be achieved in practice if charges remain low and their enforcement partial. While the new legislation makes the charge system more

flexible and comprehensive, enforcement problems will not be overcome and the potential of the charge system will not be fulfilled without proper institutional capacity building to improve the monitoring and control of discharge activities.

Source: "Wastewater Effluent Charge in Mexico" by Ronaldo Seroa da Motta, Hugo Contreras and Lilian Saade, in Economic Instruments for Environmental Management: a Compendium of Case Studies, UNEP, 2000.