

THE DISSIMILAR EXPERIENCE WITH ECONOMIC INSTRUMENTS TO
CONTROL POLLUTION AMONG LATIN AMERICAN COUNTRIES: CAN WE
EXPLAIN IT?¹

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Abstract

The experience of Latin American countries with economic instruments in environmental policy falls behind that of developed countries and is very dissimilar. Based on the environmental economics and environmental law literatures, two factors may explain this situation: the lack of institutional capacity and political economy issues. In this paper I critically review both arguments based on some experiences in the region, and stress important factors that are not adequately emphasized in the previous literature.

1. INTRODUCTION

Environmental economists have been advocating economic instruments to control pollution for more than thirty years on the basis of several advantages that, they assert, this type of instruments have over the traditional prescriptive instruments; namely: flexibility, dynamic incentives to reduce emissions in the medium and long run and, primarily, cost-effectiveness.² According to this argument, Latin American countries

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² I use the term “economic instruments” to refer to emissions taxes and “cap and trade” schemes, and the term “prescriptive regulation” (Ellerman, 2007) to refer to the type of regulation that tells the plants how to abate emissions and by how much. This is the case, for example, of technology-based emissions standards. I do not deal in this paper with “indirect” instruments to control pollution (i.e.: those not regulating the end-of-pipe level

should be interested in their implementation in order to save scarce resources and avoid further compromising economic development possibilities. However, the history of environmental policy in Latin America does not fully validate this presumption. The experience of Latin American countries with economic instruments in environmental policy falls behind that of Europe and the U.S. It also differs markedly between countries. Countries that have experienced with economic instruments are the less. The bulk majority of Latin American countries still base their environmental policy uniquely on prescriptive regulation. What accounts for this difference? This paper addresses this question critically reviewing the possible answers that the environmental economics (and law) literature provide to this question and drawing lessons from the experiences in the region with and without economic instruments. As a result of this exercise, other factors not adequately emphasized that in this literature are stressed.

The paper is organized as follows. In the next section I concisely review the argument favoring economic instruments. This section puts in perspective the arguments over which environmental economists conclude that economic instruments are superior and is used as an analytical framework against which background conclusions are to be drawn. Section 3, briefly enumerates the experience of Latin American countries with economic instruments. Section 4 reviews the answers that economists have provided for the lack of more experience with economic instruments in Latin American countries. Section 5 critically discusses these answers in the light of the some experiences with and without economic instruments. Finally, Section 6 concludes.

2. WHY ENVIRONMENTAL ECONOMISTS ADVOCATE ECONOMIC INSTRUMENTS: A CRITICAL REVIEW

Analyzing the apparent puzzle that represents observing regulators choosing prescriptive instruments instead of economic instruments to control pollution demands to

of emissions directly, but other indirect determinant of the level of pollution, such as the abatement the abatement or production technique).

start by reviewing the arguments over which environmental economists claim the superiority of economic instruments.³

Perhaps the most important advantage of economic instruments in the view of environmental economists is their *cost-effectiveness*: economic instruments achieve the targeted environmental quality goal at the lowest aggregate (abatement) cost possible in the short run. Prescriptive regulation, which is often characterized by uniform emissions standards in the economic literature, is more costly because it fails to exploit the abatement costs differences between firms. Put more formally, uniform emission standards fail to equalize marginal abatement costs between firms, as economic instruments do and the minimization of abatement costs requires when assuming the source's point of emission does not matter. In this circumstances, the wider the difference of (marginal) abatement costs among sources, the more promising the relative gain from implementing economic instruments versus prescriptive (uniform) instruments (Newell and Stavins, 2003). When the locations of the sources matter, the minimization of abatement costs does not call for the equalization of marginal abatement costs among the firms, but instead to the equalization of the ratio of abatement costs to the ratio of the impact coefficients of the emissions of the different sources in different locations into ambient quality at the regulated site (see Hanley et al., 1997, for example). This solution requires the regulator to estimate the impact coefficients, which according to Russell and Vaughan (2004) makes economic instruments *information and computation intensive* relative to emissions standards in this case. It could be argued though, that the relative intensity of information and computation required by both types of instruments *in the cost effective allocation* of emissions does not differ much between this case and the case of uniformly mixed emissions. In both cases, the differences in tasks for the regulator under tradable permits versus emission standards are the same. Under tradable permits the regulator saves itself the need to gather information on production and abatement

³ Such an exercise leads inevitably to an analysis of the circumstances under which these arguments are valid, and to the review of other dimensions according to which environmental policy instruments can be judged. These are, not surprisingly, closely connected to the explanations that economists have given to explain the choice of prescriptive regulations instead of economic instruments. But I postpone this discussion to Section 4.

processes and costs, as it needs in the emissions standards case, but it has to keep track of permit trades. Therefore, the classic *informational and computational intensity* argument favoring tradable permits (Böhm and Russell, 1985) may be robust to non-uniformly mixed pollutants.⁴

Environmental economists have also advocated economic instruments because of their *dynamic incentives*. These refer to the relatively more incentives to reduce emission levels that these instruments create in the long run by, for example, inducing profit-maximizers regulated firms to develop techniques and/or invest in technology to reduce costly emissions. With prescriptive, technology-based regulation the firms do not have incentives to look for ways to reduce emissions beyond the point established in the regulation. On the contrary, emissions taxes and tradable permits create this incentive because reducing emissions implies always a reduced tax receipt, or a reduction in the number of permits to buy.

Another important criterion to evaluate alternative policy instruments is the *ease of monitoring and enforcement*. This dimension refers to the issue of how costly is it to detect and sanction violations with one instrument relative to the other. In this issue, it could be argued that economic instruments may have greater monitoring and sanctioning costs because of two reasons: one, the firms may have greater incentives to violate an economic instrument than a emission standard, given all else equal; second, under economic instruments the regulator does not have only to monitor emissions but also to track tax payments or permits trades. What does the literature says in this respect? The classic models on which the abatement cost-effective argument of economic instruments relied assumed perfect compliance explicitly.⁵ Consequently, the economic theory behind the cost-effective argument focused only on abatement costs. More recently,

⁴ Emissions taxes share the same disadvantage as prescriptive regulation on this metric. There is no informational advantage between setting emissions standards or emissions taxes (Weitzman, 1974). This is why environmental economists have been advocating tradable permits more firmly recently. These instruments are cost-effective and do not require the regulator to obtain any information from the firms regarding abatement costs, as taxes do.

⁵ This could be the reason why recent conclusions from the experience with economic instruments surprisingly include the provision of “powerful reminders of the importance of monitoring and enforcement” (Stavins, 2007, p. 26).

environmental economists have started to pay attention to the validity of the argument stating the cost-effective superiority of economic instruments when monitoring costs are added to abatement costs (See Malik, 1992, and Chavez, Villena and Stranlund, 2008). These exercises show that the distribution of emissions and monitoring resources resulting from a system of tradable permits does not minimize the sum of abatement and monitoring costs of the program. Nevertheless, it has not been shown formally that a system of emissions standards could achieve the same environmental target at less cost than a system of tradable permits with asymmetric information.

In sum, from a strictly theoretical point of view, the cost-effectiveness argument in favor of economic instruments remains a powerful one, although with more subtleties than in the past. Environmental economists have learnt from actual experiences that the successful implementation of economic instruments depend on issues of design and implementation somewhat overlooked in the past, such as the flexibility in the timing of trading, the administrative burden, political economy considerations, and monitoring and enforcement issues (see Stavins, 2007, Harrington, et al., 2004, and Hahn, 2009). However, the argument remains contentious (See Cole and Grossman, 1999, Russell and Vaughan, 2004).⁶

The criteria reviewed above do not represent a complete list of criteria based on which the desirability of a specific instrument is to be judged. They are, quite differently, the criteria over which environmental economists constructed their case for economic instruments. There are other important criteria that are also recognized by environmental economists (see for example Böhm and Russell, 1985, Sterner, 2003, Harrington, et al. 2004, and Freeman and Kolstad, 2007, for a (non-uniform) list of these criteria). But these have not played as important a role as the above in the classic text-book policy recommendation in favor of economic instruments. Not surprisingly, some of these other criteria play a fundamental role in the explanations given (sometimes by environmental

⁶ The empirical validation of the argument is a difficult task to perform and has given mixed results. Harrington et al. (2004) and Harrington and Morgenstern (2007) report mixed results with respect to cost savings comparing experiences in the US and Europe with both types of instruments. Stavins (2007) reports that the US experience with tradable permits “provides evidence” that cost savings can be achieved with the implementation of this instrument.

economists themselves) for the apparent puzzle that represents not observing more experiences with economic instruments in the region, as we will see in Section 4.

3. THE LATIN AMERICAN EXPERIENCE WITH ECONOMIC INSTRUMENTS

Past reviews of the experience of Latin American countries with economic instruments have been rather lax with the definition of what is an economic instrument. (See, for example, Acquatella, 2001, and the country studies cited there). But if one includes in the list of experiences only those instruments that put a price on the pollution level of emissions, as the familiar text-book like pollution taxes and tradable permits do, the list shrinks considerably. Moreover, all the programs in the list are based entirely or in part on the presumptive level of pollution, as the base for calculation of the proper charge or the permit. None of them rely entirely on continuous self-report of emission by the firms and monitoring. I will start reviewing those more closely resembling the text-book case and finish with those based entirely on presumption levels of pollution and no monitoring on the part of the regulator.

Colombia's Discharge Fee for Water Effluents

Probably the most text-book like economic instrument implemented in the region is Colombia's water effluents discharge fee. The fee came along a major institutional change that occurred in Colombia at the beginning of the nineties. Soon after been elected, the new Colombian President Gaviria called for a referendum for a Constitutional reform. The new Constitution, approved in 1991, "...included the principle of Sustainable Development as a pivotal element of the economic and social life of the country" (Uribe, 2004, pg. 20). At the same time, a new environmental policy with major institutional and regulatory changes was drafted. These changes included the creation a Ministry of the Environment and the development of economic instruments. In order to implement it, the government had to get approval of the new environmental policy by the national Congress, which essentially did without major changes (Uribe 2005). The result was Law 99 of December 1993. Article 42 of Law 99 established that air, water or other media emissions are subject to fees ("tasas retributivas"), and that these fees are to be set by the regulators in accordance to their external and recovery monetary costs. The fees

were designed to act as complements of emission standards. They charge the pollution content of emissions below what is permitted by law. Emissions above the legal standards are subject to sanctions. Article 42 also established that these fees could differ by watershed or region, in accordance with the institutional framework instituted by Law 99, in which the national environmental policy is designed by the Ministry of the Environment but implemented by Regional Autonomous Corporations (*Corporaciones Autónomas Regionales*, CARs) and the Environmental Authorities of the cities with more than a million inhabitants (*Autoridades Ambientales de los Grandes Centros Urbanos*, AAUs). Both the CARs and the AAUs are in charge also of the collection of the fees. These fees were regulated by Decree 901 of 1997, which established the calculation and charge methods for discharge fees for the load of Biochemical Oxygen Demand (BOD₅) and Total Suspended Solids (TSS) of water effluents of point discharges. According to the decree, a minimum national fee is defined annually by the Ministry of the Environment. This minimum value of the fee can be adjusted upward by a “regional factor”. This regional factor is set every five years by the CARs and AAUs and adjusted every six months if the observed pollution reduction is below the targeted pollution reduction for the river, watershed, region or city, also set by the CARs and AAUs by a participatory process with different stakeholders. The information on pollution used to calculate the fees are based on self-reports by the sources. Municipal sewage companies could report emissions based on presumptive levels.

One of the many implementation problems of the discharge fees was the rampant noncompliance of one of the most important type of polluters, the municipal sewage companies (Blackman, 2009). Noncompliance by these companies caused the fee to increase without limit, which triggered the lobby of industrial sources who complaint that they were paying for the noncompliance of the municipal authorities. This political situation is essential to understand why in 2003 the new President Uribe repealed the Decree 901 with a new Decree 3100, and the changes introduced by this (later modified by Decree 3440 of 2004). Essentially, these changes are: (a) It mandated the CARs and AAUs to establish (i) individual targets of pollution reduction for municipal sewage companies and for sources whose loads are more than a fifth of the total loads received by the water body, and (ii) group targets for the rest of the sources, according to the

group's type (industrial branch, etc.); (b) It mandated the CARs and AAUs to ask the municipal sewage companies to present a Plan for Pollution Management in accordance with the pollution reduction target; and (c) it changed the method by which the fee is adjusted. First, the adjustment is now annual, instead of every six months. Accordingly, sources have to report once a year, instead of two, as before. Second, the calculations of the pollution load relative to the target in the regulated river or watershed leave aside the pollution load of municipal sewage companies. That is, as before, the fee TR_j for the pollutant j is

$$TR_j = TM_j \times FR_j$$

where TM_j is the national minimum fee and FR_j is the regional factor of adjustment, but now the regional factor of adjustment for a given pollutant is calculated according to the following formula;

$$FR_t = FR_{t-1} + \frac{(Cc - CcM)}{(CcL - CcM)}$$

where,

FR_t : regional factor in year t for pollutant j , FR_{t-1} : regional factor in year $t-1$ for pollutant j , Cc : Total kilograms of pollutant j emitted by all regulated sources except municipal sewage companies in the year $t - 1$, CcM : the pollution load target for pollutant j (Kg./year) set for the watershed, discounting the pollution load of municipal sewage companies; CcL : total kilograms of pollutant j emitted by all regulated sources in the watershed that are not municipal sewage companies at the beginning of the five-year period.

Also, the adjustment of the fee calculated as above covers only those sources that did not comply with the corresponding individual pollution reduction target. Therefore, the fee cannot necessarily be the same for all sources. Finally, the adjustment factor has a maximum value of 5.5. if the target is met in the five year period, the value of the FR is 1 at the beginning of the next period. If not, the value of the FR is equal to the value of the previous period.

Costa Rica's Environmental Fee for Discharges

Almost six years after the first version of the Executive Decree instituting a fee for discharges was published, Costa Rica finally implemented it in October 2008 and

started collecting fees in January 2009⁷. In its final version (Executive Decree #34431), Costa Rica's Environmental Fee for Discharges puts a price on the kilograms of COD (Chemical Oxygen Demand) and TSS (Total Suspended Solids) discharged per quarter-year. The fee does not substitute the previous emission standards, but complements them in the following way. The fee is actually a three-part tariff, with segments defined by the concentration level C_j of the pollutant j in the source's effluents relatively to the ambient concentration of the pollutant in the water body at the point of discharge (Ca_j) and the maximum allowable level of discharge (Cp_j , the standard). The source pays no fee for the emitted kilograms of COD and TSS if $C_j < Ca_j$; it pays a fee of $\$0.22 \times 0.75$ and $\$0.19 \times 0.75$, respectively, per kilogram of COD and TSS emitted if the concentration level of the pollutant is above that of the receiving water body at the point of discharge, but below the standard, $Ca_j < C_j < Cp_j$. Finally, if $C_j > Cp_j$, the total fee paid by the source is the sum of a fee of $\$0.22$ and $\$0.19$, respectively, per kilogram of COD and TSS emitted corresponding to the concentration levels in the interval $(Cp_j - Ca_j)$, plus $\$0.22 \times 3.5$ and $\$0.19 \times 3.5$, respectively, per kilogram of COD and TSS emitted corresponding to the concentration level in excess of the standard $(C_j - Cp_j)$.

The fee is applicable only to point-sources of pollution. In order to calculate the fee, the ministry of the environment asks each source to report emissions once a year. If the source does not report emissions, the government can estimate the source's presumptive emission levels using past reports, number of employees, level of production, inputs used, the source's branch, or bibliographical references. Because the program is new, there is no analysis of its performance, yet.

Santiago de Chile's Emissions Compensation Program

In March 1992, the Supreme Decree No. 4 transformed Chile in the first Latin American country, and second non-OECD country, after Singapore, to implement a tradable permits program to control air pollution. The program, named the Emissions Compensation Program, was designed to control total suspended particles (TSP) emissions from fixed sources in Santiago. The market became operational in 1993 and

⁷ J. M. Zeledón, Director de Aguas, Ministerio de Ambiente, Energía y Telecomunicaciones, e-mail communication, August 25th, 2009. M. Peña, Ecolegis Environmental Law Services, e-mail communication, August 12th, 2009.

compliance became mandatory in 1994 (Montero et al., 2002). It is worth noting that Chilean program is contemporaneous to the U.S. 1990 amendments to the Clean Air Act that established the Sulfur Dioxide (SO₂) Allowance Trading Program, who's Phase I started in 1995, and to the Regional Clean Air Incentives program (RECLAIM), which started in 1994.

The sources covered by the Chilean Emissions Compensation Program (ECP) are industrial, domestic and other boilers in the metropolitan area of Santiago with a maximum flowing capacity greater than 1,000 m³/hour by March 1992. The emission permits in Santiago's ECP are not actually emissions permits in the classic sense, but emission capacity permits. This maximum capacity was estimated by the authorities multiplying the maximum volumetric flow of the source (in m³) by an estimated concentration of TSP/m³. The estimated concentration was not source-specific but an estimated average over all sources. This estimated concentration was adjusted from 56 mg/m³ to 50 mg/m³ in 2000, and again to 32 mg/m³ in 2005 (Coria and Sterner, 2008). The permits granted to the original sources covered by the program were called Initial Daily Emissions (IDE). Each IDE grants the owner a permission to have the capacity to emit one kilogram of TSP per day. New sources entering the program have to "compensate" for their emission capacity buying IDEs to one or more of the existing sources. If the regulator approves this "compensation", it grants an equivalent number of permits to the new source. (The new sources' permits are called Permitted Daily Emissions (PDE), but are equivalent in all sense to the IDEs of the original sources). Both types of permits allow the boiler's operator to legally have the capacity to emit one kilogram of TSP per day in perpetuity.

The enforcement of the program is based on an annual self-report of the daily emission capacity of the source, which has to be below the number of permits that holds. The source does not actually measure its emission capacity itself but instead it has to hire an accredited laboratory to do this job, which is the one actually presenting the report to the authorities. The regulator then conducts inspections on both the sources and the laboratories to check for the emissions capacity reports and the laboratory equipment characteristics.

As it is the case also in Colombia's and Costa Rica's discharge fee programs, in spite of being operating in a market of emission capacity permits, the regulated plants in Santiago's ECP were also subject to an emission standard of 122 mg/m³. Emitting above this concentration level is illegal, independently of the number of permits hold. So the Santiago's ECP is another example of an economic instrument that does not substitute a previous emission standard, but complements it.

Other Experiences with Emission Compensations in Chile

Apart from the well known ECP, Chile has recently implemented an emission compensation program for big industrial sources of NO_x emissions in the Metropolitan Santiago. This program assigned for the year 2007 a cap of emissions of NO_x that is 66% of the aggregate estimated emissions of 1997. This cap was designed to be reduced by 50% in 2010 to comply with the Metropolitan Area Decontamination Plan (Calfucura, et al. 2008). Not exactly a tradable permits program, the authorities of the Metropolitan Area of Santiago implemented also another program in which new investment projects not complying with certain emission limits are obliged to compensate their emissions in a 100% with that of existing sources in order to pass the Environmental Impact Assessment.

Other programs

Other pollution control programs implemented in Latin America, and frequently cited as experiences with economic instruments in the region, are somewhat different from the classic text-book like economic instrument. An example is the State of Sao Paulo's industrial effluents charge in Brazil. Implemented in 1981 by a law passed in 1977, the charge was designed only as price to cover the costs of the treatment of industrial effluents by the state's water and sanitation company (de Gusmao, 2000). The amount of the charge depends on a theoretical level of pollution, calculated as a function of the industry sector, but not on the actual level of pollution.

Another example is the water charge implemented in the Brazilian Paraiba do Sul river basin since March 2003 (Braga, et al., 2005; Lanna, 2003). This charge depends on a theoretical fraction of treated effluent in relation to the total volume of effluent produced and on a theoretical efficiency in the treatment process. Nevertheless, actual effluents loads are not regularly monitored nor reported by firms. In fact, a recent survey

found that 157 out of 488 industrial plants could not determine the volume of effluents produced by them and only 15% of the 488 plants surveyed declared that they monitor their effluents (Féres, et al., 2005). Lastly, the level of the charge is significantly below the lowest marginal abatement cost estimated by these authors, suggesting that the charge is not a large an incentive to induce a reduction in pollution loads.

Finally, an attempt to institute water discharge rights in Mexico has had significant implementation problems (see Escalante and Aroche, 2000; and Huber, et al. 1998).

The above reviewed experiences show that the countries in the region that have implemented economic instruments are the less: Chile and Colombia, in the nineties, and Costa Rica in 2008. The following section summarizes the possible answers that the literature has given to explain the puzzle that this situation represents in light of the environmental economists' policy prescriptions.

4. THE PUZZLE: ANSWERS

Why is it that some Latin American countries do not implement economic instruments to control pollution, given the apparent advantages that these instruments have? In this section I classify possible answers to this puzzle in two groups: (a) those centered on the “institutional capacities” of these countries, and (b) those centered on the positive political economy of regulatory instrument choice.

Institutional Capacity in Less Developed Countries

The puzzle of why there is in general apparently less experience with economic instruments in developing countries despite the apparent advantages of the latter might be explained by the clash between the lack of institutional capacity of these countries and the burden that these instruments pose on regulatory institutions, making the implementation of these instruments impossible in the short run (Russell and Powell, 1996). According to these authors, the formal institutional capacity that is a necessary condition to implement *any* instrument may be illustrated by (a) the presence of the necessary regulatory framework, (b) the existence of coordinating body bringing together the agencies in charge of the natural resources management with a development planning

agency, and (c) the availability of skilled personnel in environmental agencies that is necessary to implement the regulations, “(t)his means having everything from lawyers to write regulations to technical specialists ...who can operate...monitoring equipment..” (Russell and Powell, 1996, pg. xv). According to these authors, less developed countries without this formal institutional capacity may be unable to successfully implement pollution control programs based on economic instruments. The authors conclude that the choice of policy instruments must be *compatible* with a country's institutional capacity, implying “...an evolution from those instruments more easily defined and enforced, and the least closely connected to ambient quality goals, toward those involving more difficult definition tasks and closer connections to desired ambient results, aiming at tradable permits in the long run” (Russell and Powel, op.cit., p. 20). Several authors in the economic literature have agreed with this conclusion (Barbe, 1994; CEPAL, 2000 and 2001; Eskeland and Jimenez, 1992; O’Connor, 1998; Seroa da Motta, et al, 1999). Other authors have also provided similar institutional capacity arguments as well as culture, traditions and habits to explain the failure of economic instruments in developing countries (Bell, 2003, Russell and Bell, 2002, Bell, 2002 and 2005, Russell and Vaughan, 2003).

Another type of institutional capacity that may be as important as the capacity of the regulators is the capacity of firms (Stavins, 2007). Under prescriptive instruments the firms incorporate the regulators’ guidelines and proposed technology to comply with emissions standards. In contrast, by putting a price on pollution, economic instruments transform it into a costly by-product whose level of production must be strategically decided by the firm in order to maximize profits. This may require a change in the organizational structure that many firms may not have the wherewithal to do. In the case of small firms, doing nothing may be the optimal decision to make given the low probability of being inspected that this type of firms faces (Gunningham and Sinclair, 2002). Even for bigger firms, the necessary re-structuring may take time since it may include changing organizational and production or abatement processes over which they may have built expertise. The implicit assumption by economists has been that the new resources that economic instruments demand from the firm are freely available within the firm or they can be easily bought in the market. If this is not the case, the capacity of the

firms to respond cost-effectively to economic instruments may also threaten the successful implementation of these instruments. The lack of capacity in firms may also be a factor that may explain the opposition of firms to economic instruments, an aspect of the political economy of instrument choice that is the topic of the next section.

The Political Economy of Instrument Choice

A second set of answers of why have prescriptive or uniform instruments been used more frequently than incentive-based instruments, despite the cost-effective advantage of the latter, is provided by the political economy of instrument choice.⁸ According to the positive political economy, the instrument choice is an equilibrium result of the interaction of the different groups of stakeholders and their relative power through the given institutional mechanisms (Keohane, et al., 1998). The demand side of the “political market” includes several interest groups: polluting firms, environmental organizations, workers and consumers.⁹ The supply side of the market is assumed to be composed of legislators, who seek to assure re-election and are therefore willing to trade some effective support for a given environmental policy instrument in exchange for votes or monetary contributions. The question of why non economic instruments are more commonly used can be answered by examining the incentives of each of the aforementioned interest groups. Profit maximizing firms will demand those policy instruments that minimize their costs of compliance. Therefore, firms will prefer to emit a certain level of a pollutant under an emission standard than to emit the same level under the corresponding emissions tax. Under the former they only incur in abatement costs, while under the latter firms also pay a certain amount for every unit emits. This is true for every level of required abatement, assuming increasing marginal abatement costs.

On the other hand, preferences over tradable permits are firm specific; they depend on how many permits a firm is allocated (if any), its abatement costs and the permit price. In other words, it depends on the firm being a net seller or a net buyer of permits, in equilibrium. It depends also on the process by which permits are allocated. Would-be net sellers firms may prefer grandfathered permits to emissions standards.

⁸ What Russell and Powell (1985) called “political impact”.

⁹ These are not mutually exclusive categories, of course.

Auctioned permits will generally be opposed by most firms when compared to emissions standards. This may be the reason why in almost all marketable permits programs actually implemented the vast majority of the permits were allocated for free.

With respect to labor unions, because environmental regulations create costs that firm managers and owners use to pressure governments with the possibility of lost jobs, and because unions tend to defend jobs, they will probably be on the side of their employers in the case of pollution control, particularly when it does not affect their safety at work. Also, environmental regulations can threaten the production of dirty inputs or technologies and may be resisted by unions in these sectors of the economy (Stavins, 2007).

Environmental organizations, a third stakeholder, may also prefer standards to taxes or tradable permits if they see the latter as licenses to pollute. Citizens and consumers, even if they prefer to maintain themselves “rationally ignorant” about the pros and cons of the different instruments for pollution regulation, a very large number of potential beneficiaries may opt to free ride on the lobbying efforts of others. Even if this is not the case, the number of people involved precludes a degree of coordination as effective as that of polluting firms. Therefore, in general, theory predicts that one should not expect consumers or citizens to lobby on the issue of instrument choice.

From the supply side of the “political market”, politicians may prefer instruments for which the costs of regulation and possible exemptions are less visible. This is not the case for charges and tradable permits. Second, politicians often engage in “symbolic politics” and non economic instruments may be seen as stronger “statements of support for environmental protection” than emission charges or tradable permits” (Keohane, et al, 1998, p. 360). Third, politicians may be more interested in the distribution of costs than in their minimization, the main advantage of incentive – based instruments. In other words, politicians may be reluctant to implement instruments that may cause some firms to close, re-locate or lose jobs. As a result, they may have a bias toward favoring existing standards.

The positive political economy allows an analysis of the incentives of regulatory staff members also, not only legislators. Reasons for policy makers or bureaucrats to oppose economic instruments are that these may not require the same technical expertise

than prescriptive, technology – based instruments do. Related, economic instruments shift control decisions from regulatory staff to polluting firms. Both issues may affect their prestige and job security (Keohane, et al., 1998).

Having discussed the arguments based on which environmental economists recommend economic instruments as more desirable than prescriptive regulation, and the answers they have given to the question of why regulators may still opt for prescriptive regulation, I turn in the next section to assess the validity of these arguments in light of Latin American experience with and without these instruments.¹⁰

5. ARE THEY RELEVANT EXPLANATIONS?

Are the above answers provided by the literature to the puzzle cost-ineffective instrument choice satisfactory to explain the current situation in Latin America? Or do the implemented programs based on economic instruments in the region, together with the unsuccessful attempts suggest otherwise?

5.1. Institutional Capacity

Let's look first at the institutional capacity argument. The strategy to test the institutional capacity argument is based on the analysis of the literature that has evaluated these programs. But first, as a motivation and first-level analysis, I review the position that the different countries have in different indexes of institutional quality in general, and environmental governance, in particular.

¹⁰ It has not to be concluded from the above analysis, though, that the choice of policy instruments for environmental protection is a matter of “either / or” with respect to economic instruments versus prescriptive regulation. The discussion above makes it obvious that “no policy ranks first among all dimensions of policy comparison” (Cole and Grossman, p. 890, citing Palmer et al., 1980) and consequently the analysis does not ignore that the most effective solution to the pollution problem at hand may imply the use of prescriptive and economic instruments at the same time (Gunningham et al, 1998).

5.1.1. Institutional quality indexes

An internal survey at the Inter American Development Bank (IADB) ranked Costa Rica with the highest possible value of institutional capacity in a five-point scale (Russell and Powell, 1996). Chile and Colombia ranked in the second highest possible value. Chile leads Latin American countries according to an Index of Institutional Quality published by the International Policy Network (Krause, 2009). It is followed by Costa Rica, which displaced Uruguay from the second place in 2009. Colombia ranks 8th. Costa Rica ranked first among Latin American countries and eighteenth in the world in a recent Environmental Governance Indicator (Esty, et al., 2005). Chile is 2nd and Uruguay is 3rd in Latin America. Colombia appears in the 8th place, below Panama, Dominican Republic, Nicaragua, Bolivia and Brazil. The conclusion that can be drawn from this simple exercise is that, as measured by these rankings, there is not a direct relation between the institutional capacity or quality of a country and the choice of economic instruments. For example, Colombia ranks systematically below Uruguay (which ranks in the top three positions) in every ranking except in that of the IADB. Nevertheless, Uruguay has not implemented yet economic instruments to control pollution. Nevertheless, these rankings do not allow saying much more. In order to do that, I turn to the literature and review how the programs based on economic instruments have performed; what problems have they encountered in its implementation, if any. Finally, I review a paradigmatic case of good institutions and no experience with economic instruments and conclude.

5.1.2. Case studies

By the early nineties, the situation in Colombia was characterized by low compliance level of environmental norms by the private sector and low institutional capacity in the national environmental regulatory office (Uribe, 2004). This situation could not be completely reversed by the time the charges were implemented in 1997. Blackman (2009) reports that the Colombian water discharge program encountered several problems related with the country's institutional capacity. In particular, the degree of implementation of the fees varied greatly between regional authorities (CARs and AAUs). While some of these were able to cover all of the sources that should participate

in the program, others were not able to cover a single source. The implementation of the program suffered also from a considerable lag. Only one regional authority started invoicing and collecting fees in 1997, the year the program started. Blackman (2009) cites an evaluation of the program by the Comptroller General of Colombia done in 2003, where the conclusion is that the application of the program is “highly unsatisfactory”. Only ten regional authorities had implemented the program at that date. Noncompliance has been a problem, particularly by the municipal sewerage companies, the main dischargers. In some regional authorities the collection of invoiced fees was low. In sum, it can hardly be argued that all the Colombian regional authorities had the institutional capacity to implement the discharge fee program at the time of its implementation. In fact, Blackman argues that as important as the incentive to polluters, the fee program acted as incentive for regulators to improve the regulatory process.

The Chilean experience may be viewed as running with less problems of implementation. Part of the reason may be that the ECP covered only sources in the metropolitan area of Santiago, a smaller and richer area than Colombia. Nevertheless, some of the conclusions in the literature seem to suggest that not all the necessary institutional capacity was present in this case, either. In the first place, it is important to note that the Supreme Decree No. 4 was promulgated in March 1992, two years before the Law 19,300 (Environmental Basis Law). Among other things, this law created the National Environmental Commission, Chile’s national environmental regulator, with the objective of organizing the environmental legal and institutional framework in Chile, scattered in several ministries and other regulatory offices (Bauer, 2004). Because of the absence of a national environmental office at the time of the decree, a new office was created to administering the program (PROCEFF). But the limited institutional capabilities did not end there. Palacios and Chávez (2002) report that other sources of TSP emissions, like industrial firms, were not covered by the program because of the difficulty of estimating their maximum capacity of emissions. As a result, the program covered only 4% of the estimated total emissions of TSP in the metropolitan area of

Santiago (Palacios and Chávez, 2005).¹¹ A possible difference with Colombia is that Chilean regulators took into account these institutional deficiencies at the time of developing the legislation and designing the program. “It was recognized that monitoring and enforcement capacities were weak and underfunded, and that any system to be established had to keep monitoring and enforcement costs low for both sources and the regulatory agency” (O’Ryan, 2002, p. 3). This is why Santiago’s ECP is an emissions *capacity* trading program, not an emissions trading program. This simplifies the necessary monitoring of the program. Nevertheless, besides being an emissions *capacity* trading program and besides not covering industrial sources because of the difficulty of estimating their emission capacity, Santiago’s ECP program has been characterized by several problems. One of these problems is frequent violations (Palacios and Chávez, 2002). The program has been characterized by a significant rate of non-compliance since its beginnings. In 1997 46% of the sources in the program were in violation of their capacity permits. This percentage fell when natural gas from Argentina arrived to Chile but it may be rising again due to the end of the supply of this fuel, what causes the boilers to return to dirtier fuels. In 2007 the 24% of the boilers were out of compliance, up from a minimum of 21% in 2005 (Coria and Sterner, 2008). There has also been a relatively small number of transactions (240 between 1997 and 2007), 76% of which were intra-firm (Coria and Sterner, 2008). The reasons for this relatively low trading activity are regulatory uncertainty and transaction costs (Montero, et al., 2002). All transactions have to be approved by the regulator. The average period for a transaction to be approved is about 20 months, although the length has been trending downward. Although the program began in 1993, the first transaction was approved in 1998. For transactions before 1998, it took regulators 39 months to approve them (Coria and Sterner, 2008).

What the Colombian and Chilean examples seems to suggest, according to what these authors report, is that a well developed institutional capacity is not a necessary condition for a country to implement economic instruments. It may be a necessary condition for its successful implementation, but not for the choice of the instrument. It

¹¹ In contrast, “the U.S. electric power industry accounts for approximately 70 percent of total U.S. SO₂ emissions and 20 percent of total U.S. NO_x emissions from man-made sources” (EPA, 2006, pg 3).

seems that both Chile and Colombia lacked skilled personnel and other necessary resources in environmental agencies that are necessary to successfully implement the regulations. But these deficiencies did not prevent these countries to choose economic instruments to control pollution. Thus, Russell and Powell's observation that economic instruments will experience implementation difficulties in less developed countries like Latin Americans is validated by the experience of Colombia and Chile. Nevertheless, the institutional capacity argument, at least as it is defined in the literature, does not help to explain the puzzle of the differing experience with economic instruments among Latin American countries. This is true not only because it seems that both Chile and Colombia were not fully prepared to implement successfully the economic instruments for which they chose to control pollution, but also because there are other countries that seem to represent situations in which the institutional capacity is present, at least in comparable quality as it is in Chile and Costa Rica, but still base their pollution control policy in prescriptive instruments. This is the case of Uruguay, for example.

This country has a history of 30 years of using prescriptive (uniform) emissions standards to address water pollution nation-wide and more than 40 years in the case of the capital city of Montevideo.^{12 13} Jurisdiction over industrial water pollution in Montevideo is shared by the national environmental office (Dirección Nacional de Medio Ambiente, DINAMA) and the municipal government of Montevideo (Intendencia Municipal de Montevideo, IMM). The municipal agency is responsible for monitoring and enforcing effluent emissions standards, and the correct operation of the effluent treatment plants. This unit is also the regulatory office to which the plants report. The task of the national agency is to confer permits for industrial discharges when they determine that a firm has a treatment plant that enables it to comply with the emission standards. In other words, the national agency is in charge of ascertaining initial

¹² Ordenanza sobre la Disposición de Aguas Residuales de los Establecimientos Industriales del Departamento de Montevideo, Decreto N° 13.982 de la Junta Departamental de Montevideo, 1967, and Reglamentación de la Ordenanza sobre la Disposición de Aguas Residuales de los Establecimientos Industriales del Departamento de Montevideo, Resolución N° 16.277 del Intendente Municipal de Montevideo, 1968.

¹³ "Decreto 253/79, Normas para prevenir la contaminación ambiental mediante el control de contaminación de aguas, 1979", with amendments in 1988, 1989 and 1991.

compliance, while the municipal agency is in charge of ascertaining that compliance is maintained. However, coordination between these two offices has been historically poor.¹⁴

The standards are defined in terms of concentrations of pollutants in discharges. In the city, the program covers around a hundred industrial plants responsible for more than 90% of criteria pollutants. Every four months, these plants report to the Industrial Effluents Unit of the municipal government monthly levels of (1) production, (2) water consumed, (3) energy consumed, (4) number of employees and days worked, and (5) volume of emissions and concentrations of pollutants.¹⁵

The uniform concentration emission standards and the obligatory adoption of abatement technology impose large information gathering and computation requirements for regulators. Regulators need to monitor emissions on a relatively continuous basis to assess the degree of compliance with the standards, and at the same time collect information on the effluent treatment and the production processes of the firms in order to ensure that the treatment plant is being correctly operated and the conditions under which the emission permit has been issued are being maintained.¹⁶

Do regulators count with the necessary staff and resources to successfully implement this program? Not quite. The national division of environmental control (in charge of granting the discharge permits) is composed of only five persons. These five persons are not only in charge of monitoring and enforcing water pollution legislation, but also the rest of the national environmental regulations. Staffing is a bit better at the Industrial Effluents Unit of the municipal government, where seven persons work, but they are only in charge of industrial emissions in Montevideo. These constraints motivated an agreement between these two offices, aimed at saving scarce monitoring and enforcement resources. Nevertheless, this agreement has functioned unsatisfactorily.

¹⁴ The following paragraphs are based on Caffera (2004).

¹⁵ Some plants also report voluntarily to the national government Department of Environmental Control.

¹⁶ In order to apply and get a discharge permit, firms need to supply a large amount of information with regards to its production capacity and processes for the regulator to be able to tell if the treatment plant that a firm plan to build is capable of treating the firm's effluents.

Nevertheless, Uruguay seems to have a comparable institutional support to that of Chile and Colombia in many respects. First, the number of industrial plants covered by the uniform emission standards program in Montevideo represents more than 90% of the emissions of the most important water pollutants by these sources (BOD₅, Total suspended solids and metals). In the period July 1996 – October 2001 the municipal regulators performed a total of 549 inspections on 74 plants in Montevideo; a mean of 0.116 per plant per month. In the same period, the national government visited 211 plants in the city. In a sample of 96 industrial plants of the total of 1,189 regulated plants in the city of Bogotá in 2000, Cruz and Uribe (2002) report an average number of visits per month of 0.194, similar to that in Montevideo. Unfortunately, none of the cited papers was able to obtain information on the number of inspections performed by the regulators in the case of Santiago's ECP.

As said, firms in Montevideo report their level of emissions every four months to the municipal government. The process of self-reporting involve taking a sample (or two) of its effluents and sending it to a laboratory. This process is repeated every month. In contrast, industrial plants under the Colombian water discharge fee program reported every six months at the beginning of the program and every year after the changes introduced by President Uribe in 2003 – 2004 (Decree 3100 and Decree 3440). Similarly, in Santiago the sources declare their emissions capacity annually even though the permits are defined on a daily basis. Montevideo's situation differ also from that of the Brazilian Paraíba do Sul river basin. As commented before, actual effluents loads are not regularly monitored nor reported by firms.

5.2 Political Economy

The processes leading to the implementation of economic instruments in Chile, Colombia and Costa Rica were not absent of political economy issues. Nevertheless, they differ markedly.

5.2.1. The case of Colombia¹⁷

As argued by Uribe (2004, p. 16), “the interests of the private sector were not threatened by the environmental policies, regulations and institutions of the government” at the beginning of the nineties in Colombia. Local regulators (CARs) were captured by private interests. Nevertheless, the country managed to move from this situation to the implementation of water charges without major opposition. The explanation behind this apparent success may be the strong political support from the President itself and the cautious process of environmental institutions reform that ended with law 99 of 1993. A key player in this process was the Department of National Planning. This coordinated the design of national policy proposals, through the secretariat of the National Council for Social and Economic Policy. In August 1991 (one year after President Gaviria was elected) this National Council endorsed a policy document that proposed a major institutional and regulatory reform in Colombian environmental policy. Among other things, the document proposed the creation of the Ministry of the Environment and the development of economic instruments. This document gave birth to a legal proposal. Before presented it to Congress, the government performed a “wide public consultation process across the country with the participation of a wide range of different stakeholders” (Uribe, 2004, pg. 4) that resulted in the incorporation of some modifications to the initial proposal. These modifications included a less centralized institutional framework, the creation of five institutes of research to scientifically support policy decisions and more social participatory and control mechanisms. Surprisingly, even though the industrial sector was one of the most active participants in the process, apparently it did not perform a strong lobby against the pollution charges, although they opposed them. After the incorporations of these changes the debate in Congress centered in the jurisdictional limits of the CARS. The government wanted that these were defined by ecological criteria, but the members of Congress wanted them to coincide with the

¹⁷ This section is based on Uribe (2004), Head of the Environmental Policy and Regional Autonomous Corporations Division of the Department of National Planning between 1990 and 1994; co-writer of the Law 99 of 1993 and one of the two delegates representing the national government throughout the consultation process and discussions in Congress.

jurisdictional limits of the Departments. The explanation for this is that CARs, being the offices in charge of implementing the local development agenda, were an active political tool for Governors and parties. A definition of the limits of the jurisdictions of CARs that did not coincide with the Departments jurisdictions was seen as a threat to local political power. Although initially opposed, the national government finally conceded to this and to the creation of more CARs as part of the political negotiation in Congress. As a result, Congress approved Law 99 of 1993, which despite the mentioned modifications essentially put in the form of a law the basic elements of the policy document presented by the National Council, including the pollution charges. The approval of this law represented a political victory of President's Gaviria government and its environmental advisors, strong supporters of the environmental reform.¹⁸

5.2.1. The case of Costa Rica

Costa Rica's environmental effluents fees were inspired by the Colombian charges.¹⁹ They are a product of the Central American Program for the Modernization of the Environmental Management Systems (*Programa Centroamericano de Modernización de los Sistemas de Gestión Ambiental*, PROSIGA).²⁰ This program, financed by the Embassy of the Netherlands in San José was run by the Central American Commission for the Environment and Development and the Central American Integration System. (*Sistema de la Integración Centroamericana*, 2009). One of the explicit objectives of this program was to complement the "direct" (meaning prescriptive) environmental regulation with economic instruments. Fulfilling this objective, PROSIGA produced a policy proposal to implement environmental fees for discharges in Guatemala, El Salvador,

¹⁸ The story behind the strong support of Gaviria, and some key member of its government and legislators to the environmental reform is interesting in its own. See Uribe (2004) and the citations therein.

¹⁹ Telephone conversation with Dr. Hubert Méndez, former Mayor of San José and National Environmental Comptroller of Costa Rica. (October 22, 2009).

²⁰ *Ibíd.*

Panamá and Nicaragua, and Costa Rica.²¹ Nevertheless, it was Costa Rica the only place that the policy proposal ended implemented so far because this country had a more advanced institutional system for the environment and because the policy proponents had more political influences in Costa Rica than elsewhere (Méndez, 2009, op. cit.). Nevertheless, the political battle that ended with the implementation of the effluent charges in Costa Rica has its similarities with that of Colombia. The success seems to have been built on similar characteristics of the implementation process: (a) the design of the charges was discussed with several stakeholders, the business sector among them; through many years, (b) the national government strongly supported the implementation of the charges and (c) the academia and the scientific community of the country was involved (Ortega, 2006). But the process was not free of problems.

Costa Rica's Environmental Fee for Discharges was created in April 2003 by the Executive Decree #31176. As part of the political negotiations it was modified by the Executive Decree # 31858 of June 2004. This new Decree excluded non-point sources from the fee. It also established a more gradual implementation as that contained in the original decree. In the original decree, only 30% of the corresponding charge was going to be invoiced in the first year of implementation, 44% in the second, 58% in the third, 72% in the fourth, 86% in the fifth and 100% in the sixth year. In the new version, the percentages were 10, 20, 40, 55, 75 and 100%. The fee was scheduled to be in force by January 1st 2005. In April 2005 the Decree was contested in court by the Sugarcane Agro-industrial League of Costa Rica. The industrial league argued that the charge was really a tax, for which a law was necessary. In June 2006 Costa Rica's Supreme Court ruled in favor of its constitutionality (Peña, 2008). The implementation of the fee was nevertheless delayed. In April 2008, Costa Rica's Ministry of the Environment approved a new Decree. Finally, the fee was implemented in October 2008 (José Miguel Zeledón, Director General of Waters, Ministry of the Environment, Costa Rica, e-mail communication, August 11th 2009).

²¹ Included in "Un canon por vertidos para el control de la contaminación hídrica", by Hubert Mendez and Raúl López (2004), a technical book edited by Central American Commission for the Environment and Development. (Méndez, e-mail communication, October 20th, 2009).

5.2.2. The case of Chile

I am not aware of any written work studying the policy process that led to the Santiago's ECP. This is rather surprising, because the implementation of this program is contemporaneous to the US experience with tradable permits, and being Chile a less developed country, this represents puzzle. According to O'Ryan (2002), by the end of the eighties air pollution in Santiago was a serious problem. However the military government did not have the political will to solve it. This was done by the first democratic government of Patricio Aylwin. One month after it took office in March 1990 it undertook a major environmental policy reform in Chile. As part of this process it created a Special Commission for the Decontamination of the Metropolitan Region (CEDRM). The commission acted under the politically influential Ministry general Secretariat. This commission elaborated a Master Plan to tackle the pollution problem in Santiago. The Plan was transformed into a decree (Decree #4) by the Ministry of Health. This Decree included the implementation of the emission standard of 122 mg/m³ of TSP for existing boiler and industries and the ECP.

O'Ryan (2002) asserts that there were two reasons why a tradable emissions permits system gained political support at that time. First, because the exporting sector was receiving signals of concern from their clients with respect to Chile's environmental record, both this sector and the government were aware for the necessity of taking actions in the environmental arena in order to improve Chile's image in the world market. Bauer (2004) provides the same explanation. International trade agreement required Chile to have environmental legislation. So, much of the pressure was external, operating through the market. Second, the exporting sector wanted regulations to be flexible with minimum government intervention, and so did the government. The reason may be in the particular political times. This was a newly democratically elected government that understood that pressuring the private sector with "interventionist" environmental regulation was not the way of going through a delicate transition to democracy.

As a result, the negotiations between the government and the private sector conducting to Decree #4 "lasted only a few weeks" (O'Ryan, 2002, p. 3).

5.2.2. The case of Uruguay

Chile, Colombia and Costa Rica are the only countries in Latin America that implemented economic instruments for pollution control. But they are not the only ones where these instruments were considered. The World Bank and the Inter American Development Bank were involved in the implementation of Colombian effluent fees from the beginning. They financed “a large portion of the institutional building process”. (Uribe, 2004, p. 39). The World Bank also gave assistance and supported the implementation plan developed by the Office of Economic Analysis of the Ministry of the Environment (Blackman, 2009).

At that time the OECD and other Washington, D.C. international financial institutions promoted economic instruments for protecting the environment in other less developed and transitioning countries during the nineties (Bell, 2003). And Uruguay was not the exception.

In 1995 the municipal government of Montevideo approved the creation of emissions charges for those industries with effluent concentration levels larger than the emissions standards.²² In fact, this was not an emissions charge in the classic sense but rather what is called an emission charge with threshold. Under an emission charge with threshold the polluting firm pays $t \times (e - e_0)$, where t is the tax, e is the level of emissions and e_0 is the emissions standard. The norms distinguished industries that were emitting to municipal sewages and watercourses. The former would pay an Additional Charge (Tasa Adicional) and the latter would pay a Special Charge (Tasa Especial). But despite the difference in name, they were both very similar. Both would be calculated by multiplying the Basic Charge (Tasa Básica, a linear function of the cubic meters of tap water consumed) by a factor larger than one but less than fifteen. The final factor would be determined as a function of the number of pollutants with concentration levels above the standards and the extent of these violations.

These charges were never implemented because the Chamber of Representatives (Cámara de Diputados) repealed them in the following year through a mechanism in the

²² Articles 42 to 45 of the “Decreto de la Junta Departamental N° 26.949”, December 14th, 1995.

Uruguayan Constitution, by which citizens can present a petition for such repeal before the Chamber. The arguments behind the repeal were mainly two. One was the political economy argument behind any tax: it would raise costs to the industrial community. A second argument was that the charge was unconstitutional. Similar to Costa Rica, municipal governments in Uruguay can only create charges (“*tasas*”) if these are directly related to a service provided by the municipality. In this case the service was the sewage system, but the legal argument of the opposition in the Chamber of Representatives was that since the charge was based on cubic meters of tap water consumption and not on cubic meters of effluents discharged to the sewage system the charge was not really a “charge” but a “*tax*” (*impuesto*), which has to be approved by congress, according to the Constitution. The issue was exacerbated by the charge imposed on industrial plants emitting directly to watercourses because in these cases there was no sewage service involved.

It is interesting to note that a law or a presidential decree would have probably solved the problem. But, the right-wing government at that time apparently did not show the will to solve the political problem of the left-wing municipal government. In fact, the opposite may be true. It was a group of right-wing legislators, belonging to the coalition of the right-wing parties that promoted the repeal of the municipal charge. Supported by the industry sector, they succeeded.²³

There is no proof that the idea of implementing effluents charges originated inside the municipal government of Montevideo or any other local institution. The available evidence suggests it was an idea proposed or imposed by the Inter American Development Bank to the municipal government of Montevideo (Caffera, 2004). Reassuringly, the municipal government officials did not defend the effluent charges in terms of an economically sound instrument to internalize an externality. The reason why is that they did not have a clear understanding of the advantages of this instrument with respect to the existing effluent standards so as to defend it comprehensively in congress.

²³ Even more interesting, the political group to which the Uruguayan President at that time and several of the legislators behind the initiative to repeal the effluent charges belonged had a program proposing economic instruments and more specifically charges to control pollution (See Gudynas (1996), footnote 16).

Neither did the legislators that favored them. The discussion during the session of the Chamber of Representatives that ended with the repeal of these charges reveals their lack of understanding of the basic economic principles behind these instruments (see República Oriental del Uruguay, 1996).²⁴

6. INSTRUMENT CHOICE IN LATIN AMERICA: A CONCLUDING DISCUSSION

What can be concluded to explain the dissimilar experience of Latin American countries with economic instruments?

First, the differences in institutional capacity do not explain the dissimilar experiences completely. I have shown above that, according to the existing literature, countries that did implement economic instruments do not unequivocally have better institutional capacity than others that did not. At least in terms of what is generally understood by institutional capacity in the literature. Second, there is no obvious empirical regularity in the political economy arena in these experiences that can explain why Chile, Colombia and Costa succeeded while others did not. Santiago's ECP was the product of very special political and economic times. The process that ended in the first non-OECD experience with tradable permits lasted less than two years. In contrast, Colombia's effluent charges were the product of a more slow and careful evolution of its environmental institutions. Costa Rica's environmental fees, on the other hand, were at the same time proposed by a regional agency, not the national government, although also matched an internal evolution of its environmental policy. But from a political economy

²⁴ This is clearly illustrated by two of the three short interventions of legislators that marginally touched the issue of incentives. Rep. D. García Pintos (Partido Colorado), arguing on the illegitimacy of the charge, said: "... (the charge) converts environmental degradation, pollution and the risk of public health in a source of revenues: "The more you pollute, the more you pay", instead of preventing more pollution" (p. 97). Finally, Rep. E. Rubio (Frente Amplio) said: "We have been talking here of an eco-tax and that this affects employment. But gentlemen, the ecological component is central in a modern conception of international competitiveness! ... who is in touch with what happens in the world knows that those perverse industry men that do not invest ecologically won't succeed." (p. 110).

perspective, process in Uruguay was similar to that of Costa Rica (although it had a different end, of course), and it was similar to what could have been in more advanced countries: the industry opposed the charge, legislators maximized votes, and workers and consumers did not participate much in the debate. With some exceptions, NGOs did not participate much in the debate either. This lack of participation could have been related with their lack of understanding of basic environmental economics concepts. But in spite of this, they supported the charges as complements to prescriptive instruments and as revenue generating instruments (Gudynas, 1996 and 1999).

An empirical regularity that can be observed is that the three Latin American countries that implemented economic instruments had economists working at decisive places at the time of the instrument were proposed. These economists had the necessary political connections and support, and played a prominent role in the explaining the theoretical merits of the proposed legislation in congress and in the negotiations with different stake holders (such as the business sector).

In Costa Rica, this role was performed by Hubert Mendez, who apart from being former Mayor of San José and National Environmental Comptroller of Costa Rica, is an environmental economist. He is co-author of the technical document edited by the Central American Commission for the Environment and Development, based on which the Decree 31176 was written. He also spent two years in the constitutional room defending the project when this was been contested in court by the Sugarcane Agro-industrial League of Costa Rica.²⁵

In Colombia, this role was performed by Eduardo Uribe. An environmental economist, he was co-writer of law 99 of 1993. This law developed from the policy document endorsed by the National Council. The Department of National Planning, where Uribe worked, added the development of economic instruments to this document, including the distinctive adjustment mechanism of Colombian effluent charge, based on the classical environmental economics text-book of Baumol and Oates (Uribe, 2004). Uribe was also one of the two delegates representing the national government throughout the consultation process and discussions in Congress. Law 99 also created the Office of

²⁵ Telephone conversation with Dr. Hubert Méndez, October 22, 2009.

Economic Analysis of the Ministry of the Environment. This office, which played a significant role in the implementation of the discharge fees, was headed in that period by Thomas Black, another environmental economist.

There is no documented evidence for the case of Chile of such an individual role by an economist in the case of Santiago's ECP. Nevertheless, Chile has given economists a prominent role in the government in the recent past (See Bauer (1997), (1998a), (1998b), (2002) and (2004) for an illustration of this role in the Chilean water markets). Therefore, the absence of evidence of an individual figure in the design and implementation of Santiago's ECP may not invalidate my argument.

Moreover, no national economist was involved in the design or political defense of the 1995 repealed effluent charges in Montevideo. Multilateral aid agencies thought that this constraint could be overcome with technical assistance to "in-country partners". But the experience showed the opposite. Local environmental economists or other personnel trained in environmental economics are frequently scarce in less developed countries (Bell, 2003, p.9). This is a story seen in other countries also. For example, Bell and Russell (2002) assert that "(a)fter the fall of communism, the multilateral development banks and the Western industrialized countries promoted market-based instruments to a Central European audience eager for alternatives to central planning". Tradable permit schemes were "pursued" in Kazakhstan, Poland, the Czech Republic, and Slovenia (without delivering the desired results). What the story tells is that it may be difficult to build the "domestic resolve, will and readiness" (Bell, 2003, p. 5) to implement economic instruments from outside the country in a short time.

An increase in the understanding of how economic instruments work among legislators, policy makers and regulatory staff was one of the reasons the US moved towards economic instruments (Hahn and Stavins, 1991 and (Cole and Grossman, 1999)). This was achieved through the inclusion of economics training in law schools and the proliferation of public policy programs in universities. Environmental economists played an obvious prominent role in this training. The implementation of economic instruments in Latin America was not the product of such an evolution of the environmental institutional framework.

Moreover, one of the lessons from Chile and Colombia's experience is they have not been as successful as expected. Particularly, they have not been as successful as the paradigmatic US Acid Rain Program. This relative lack of success may be behind the lack of political support that these instruments suffered both in Chile and Colombia in the years following their implementation, as documented by O'Ryan (2002) and Uribe (2004). In sum, the region needs both more carefully designed pollution control programs based on economic instruments and better understanding of how economic instruments work among legislators, policy makers and regulatory staff in order to continue building its environmental institutional framework.

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