

THE POLITICAL ECONOMY AND INSTITUTIONAL CAPACITY OF
INSTRUMENT CHOICE: LESSONS FROM A LATIN AMERICAN COUNTRY¹

Marcelo Caffera^ξ

Universidad de Montevideo

Abstract

In this paper I subject institutional and political economy arguments given to explain the choice of cost - ineffective instruments to empirical validation through a detailed case study of the legislative decision-making process and institutional capacities of industrial water pollution control in Montevideo, Uruguay. It is argued that one of the most important factors explaining such a choice in less developed countries could be one not adequately emphasized in the literature: the absence of economists trained in environmental economics in universities, regulatory staff and other key areas of environmental policy.

ABSTRACT.....	1
1. INTRODUCTION	2
2. INSTITUTIONAL FRAMEWORK, LEGISLATION AND RESULTS OF 30 YEARS OF INDUSTRIAL WATER POLLUTION CONTROL IN URUGUAY.....	4
2.1 Institutional Framework.....	4
2.2 Legislation.....	6
2.3 Actual Policy.....	8
2.4 Results.....	11
3. WHY URUGUAYAN REGULATORS OPTED TO CONTROL INDUSTRIAL WATER POLLUTION WITH COMMMAND AND CONTROL INSTRUMENTS.....	12
3.1 The Political Economy of the Choice of Policy Instruments.....	14

¹ I would like to thank Mónica González, Enrique Garino, Hernán Mendez , Alicia Raffaele, Alejandra Benítez, Gerardo Sequeira, Rodrigo Gorriarán, Marisol Mallo, Francisca Pérez, Gerardo Balero, Alejandro Cendón, Marcelo J. Cousillas, Carlos Amorín Cáceres, Viviana Rocco, Hugo Roche, and specially Juan Dubra and Fernando Borraz for their help, comments and advice at different steps of this research.

^ξ *Correspondence address:* Departamento de Economía. Universidad de Montevideo. Prudencio de Peña 2440, CP 11600, Montevideo, Uruguay. E-mail: marcaffera@um.edu.uy. Phone: +598 2 7074461. Fax: 598 2 7083842,

3.2 Lack of Institutional Capacity in Less Developed Countries	17
3.3 Relevance of These Two Explanations for the Case of Industrial Water	
Pollution in Montevideo	19
3.3.1. Past and present institutional capacity	19
3.3.2. The Case of the Proposed Emissions Charges of 1995.....	27
4. CONCLUSIONS.....	30
5. REFERENCES	31

1. INTRODUCTION

Environmental economists advocate the use of economic instruments as a cost-effective way to control pollution.² Accordingly, less developed countries 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 and other less developed countries does not validate this presumption. Pollution control regulation in Latin America has been based almost exclusively on “command and control” instruments (CEPAL, 2000).³ It is only in recent years that some countries have incorporated economic instruments into their legislation (see CEPAL, 2000 and 2001).

² I here refer to economic instruments as those incentive-based instruments that directly control emissions, such as emission taxes and tradable discharge permits. There exists another category of economic instruments that may be called indirect economic instruments. These do not regulate emissions directly. Examples of the latter are taxes for polluting goods (e.g. gasoline) or subsidies to clean technology.

³ Similarly, command and control instruments may be classified as direct and indirect. Among the first ones are emission standards, while the second ones include technology standards. For a more comprehensive discussion on instrument classification see Russell and Powell (1996).

Why have Latin American countries relied almost exclusively on command and control regulations? What distinguishes countries that have already incorporated economic instruments into their legislations from those that still base their pollution regulation on command and control instruments? What are the conditions for a successful implementation of economic instruments?

The positive political economy literature of regulatory instrument choice and a more recent literature on the “institutional capacities” of these countries have provided possible answers to these questions. The first states, for example, that polluting firms will prefer emissions standards to emissions charges simply because under emissions standards firms pay nothing for their emissions up to the standard. Firms therefore may pressure regulators and/or legislators against the imposition of emission charges and the latter may act accordingly, influenced by the overall economic situation of these countries. These same reasons explain why regulators may relax penalties for not complying with emissions standards. The argument of the “lack of institutional capacity” states, for example, that the implementation of these instruments requires the capacity to monitor emissions continuously to enforce them and most Latin American countries may not be able to satisfy this demand. As I argue below, another institutional capacity constraint that may explain the present instrument choice in these countries is the predominance of lawyers in the legislature and their staffs who are unfamiliar with economic instruments.

This paper describes the policy setting of industrial water pollution control in Montevideo, Uruguay, with the aim of identifying and weighing institutional and political economy factors that may help to explain the present choice of command and control

instruments, as opposed to more cost-effective economic instruments. This objective is pursued through a detailed study of the legislative history of water pollution control in Uruguay, its institutional framework, and the policy results in terms of pollution abatement. The findings in this paper are based on a field research done between the years 2001 and 2004. The field research included interviews with inspectors, heads of enforcement offices, policy makers, regulators' legal advisors, engineers in charge of industrial treatment plants, and former heads of environmental offices at the Municipal Government of Montevideo (Intendencia Municipal de Montevideo, IMM) and the National Environmental Office (Dirección Nacional de Medio Ambiente, DINAMA).

2. INSTITUTIONAL FRAMEWORK, LEGISLATION AND RESULTS OF 30 YEARS OF INDUSTRIAL WATER POLLUTION CONTROL IN URUGUAY

This section describes the institutional organization and norms regarding industrial water pollution regulation in Uruguay and the actual effluents control policy implemented by the municipal and national governments. Finally, it also briefly mentions the results obtained by this policy in terms of the water quality in the three main water courses of the city of Montevideo, total discharges of the monitored plants, and violations to emission standards.

2.1 Institutional Framework

Uruguay has had a relatively high level of economic development among Latin American countries, but its environmental legislation is comparatively underdeveloped. For example, air pollution is not formally regulated, and “economic incentives” have only recently been proposed as valid policy instruments (Article 13, Law 17283, known as “Ley General de Protección del Medio Ambiente”, enacted in December 2000). Water

pollution legislation may be seen as an exception, in the sense that it has a history of more than 30 years.

Jurisdiction over industrial water pollution in Montevideo is shared by the National Office of the Environment (Dirección Nacional de Medio Ambiente, DINAMA), of the Ministry of Housing, Zoning and the Environment (Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente, MVOTMA) and the Department of Environmental Development (Departamento de Desarrollo Ambiental), of the Municipal Government of Montevideo (Intendencia Municipal de Montevideo, IMM). The Department of Environmental Development, through its Industrial Effluents Unit, is responsible for monitoring industrial effluents and for enforcing effluent emissions standards and the correct operation of effluent treatment plants. This unit is also the regulatory office to which the plants report. The task of the National Office of the Environment (DINAMA), through the Department of Environmental Control, is to confer permits for industrial discharges when they determine that a firm has a treatment plant that enables it to comply with emission standards. In other words, the National Office of the Environment is in charge of ascertaining initial compliance, while the Municipal Government is in charge of ascertaining that compliance is maintained.

This institutional organization may be in part the result of the historical evolution of water pollution legislation. It was at the municipal level that the first regulations concerning industrial water pollution appeared in the sixties, almost twenty-five years before the creation of the Ministry of the Environment. Further considering that the Ministry of the Environment suffers important budget constraints that prevent the complete swapping of responsibilities, it is very easy to understand why the Municipal

Government of Montevideo (hereinafter IMM) continues to play a role as significant as the National Office of the Environment (hereinafter DINAMA) with respect to industrial water pollution in the city of Montevideo. Perhaps because of this historical evolution and the lack of public funds, coordination between these two offices has been historically poor.

2.2 Legislation

The roots of the present national legislation of industrial water pollution can be traced back to the 1967 and 1968 Municipal Norms on the Disposition of Waste Waters by Industrial Firms.⁴ These norms are a landmark in national water pollution regulation. They were the first to establish uniform emissions standards for industrial plants emitting to waterways and those emitting to the sewage system. The standards were defined in terms of concentration levels. The norms envisioned water pollution control based on the presence and correct operation of treatment technology, rather than just directly enforcing emission standards. They established that all industrial plants were required to have an effluent treatment plant that, according to engineers at the regulatory offices, allows them to comply with the emissions standards and by this way obtain the Industrial Discharge Authorization permit. The municipal norms detailed the steps an industrial plant should follow in order to apply and get the Industrial Discharge Authorization.

The amount of information that firms supply to regulators according to these norms is surprisingly large, including: maximum daily level of production, average water

⁴ 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.

consumption, daily quantities of inputs used, a description of the characteristics of effluents and solid wastes generated, information on conditions of receptor bodies at the point of discharge, time schedules for the construction of the treatment plant, and a description of its operation and maintenance. Moreover, changes in the production process may need to be accompanied by reforms in the treatment plant in order to maintain the permit. Also, plants must have a “competent professional” responsible for the correct construction and operation of the treatment plant, including the truthfulness of reports. The rationale is that with all this information, regulators will be able to ensure that a firm is in compliance by just monitoring the existence and correct functioning of a treatment plant capable of treating the firm’s effluents.

The structure of fines is another characteristic of the Uruguayan regulations reflecting that water pollution control is based on the presence and correct operation of treatment technology. The most severe fines are for firms operating without a treatment plant. The most striking feature regarding the sanction system is that violations to emission standards are not penalized. Fines only sanction non-compliance with dispositions in the application for discharge permits or the correct operation of the treatment plant. This is a major difference with the classic treatment of enforcing emission standards in economic text-books, where sanctions are an increasing function of the extent of the violation, that is the difference between the level of emissions of a pollutant and the standard. Although striking, it may be consistent with the actual policy approach. Compliance with emission standards is impossible if the firm does not have a treatment plant (and does not dilute, which is explicitly prohibited in the legislation). Therefore, once the firm has a treatment plant, all that regulators needs to worry about to

assure that emission standards are met, if production processes or capacity do not change, is to monitor and enforce the correct operation of the treatment plant.

The regulatory approach implemented by the municipal norms of 1967 and 1968 continues to be the national regulatory approach to industrial water pollution control today. Except for the types of pollutants covered and the values of the emission standards, which have been redefined, the rest of the provisions just described have been identically incorporated in 1979 into the National Decree 253/79, which presently regulates water bodies' pollution in the entire country.⁵ Apart from redefining the level of emissions standards and including more pollutants, the most important differences introduced by the Decree 253/79 are that it transferred the Industrial Discharge Authorization process (previously in the hands of the municipal government) to the national government, and it determined ambient standards for waterways according to its predominant use (although these were never put into practice).

2.3 Actual Policy

The objective of this section is to describe how water pollution control policy is implemented in practice given the institutional and regulatory framework just described. Industrial water pollution in Uruguay is based on a system of self-reporting. Self-reports are sent to the Industrial Effluents Unit of the IMM, although some plants send them also to the Department of Environmental Control of the DINAMA voluntarily. Reports include monthly levels of (1) production, (2) tap and underground water consumed, (3) energy consumed (electricity, wood, fuels), (4) number of employees and days worked, and (5) volumes of emissions and their concentrations of pollutants. Failing to send a

⁵ “Decreto 253/79, Normas para prevenir la contaminación ambiental mediante el control de contaminación de aguas, 1979”, with amendments in 1988, 1989 and 1991.

report on time and in the correct form could lead to fines to the industry and an observation to the professional in charge. In theory, the plants have to send the reports within the two weeks that follow each reporting period. But actually this requirement is not enforced; plants do not have a clear due date for submitting their reports.

Two types of regular inspections exist, with and without effluent sampling. Sampling inspections are those in which the inspectors take samples from the plant's effluents for later analysis. These inspections always include an evaluation of the treatment plant performance as well as general questions regarding the economic situation of the firm, including changes in levels of production, or special events that could affect the effectiveness of the effluents treatment process. Non-sampling inspections include all of the above but the sample of the plant's effluents. Possible reasons for not sampling may be that the plant is not working at the time of the inspection, or that the plant is not discharging at the time of the inspection.⁶

The analysis of the actual policy cannot go without mentioning that during the years 1997 and 2001 the IMM undertook the third stage of the Urban Sanitation Plan for the city of Montevideo, with funds from the Inter-American Development Bank.⁷ Apart from the works on the city sewage system, the objectives of the Urban Sanitation Plan III included: (1) the development of a Monitoring Program for controlling industrial pollution and the quality of the city's water bodies, and (2) the increase of the institutional capacity of municipal units in charge of the enforcement of industrial

⁶ This discontinuity of discharges presents a problem for the DINAMA inspectors, who have very rigid time schedules for inspections in Montevideo because they also have to inspect firms in the rest of the country.

⁷ Contract signed in November 1996, Loan 948/OC-UR

emissions standards. (I.M.M., 2001; Multiservice – Seinco – Tahal, 2001). As part of the condition to access the credit, the Uruguayan authorities had to commit to increase the compliance levels with industry emission standards (Multiservice *et al.*, 2001).⁸ With this objective, the IMM implemented the “Industrial Pollution Reduction Plan” in March 1st 1997.⁹ The Plan relaxed some of the emissions standards set by the National Decree 253/79 and established a time schedule by which they would converge again to the original levels. The Plan gave the firms considerable time to implement changes in abatement technology. Interestingly, the municipal government seemed to have developed the Plan as a way to comply with the IADB loan requirement while at the same time recognizing the economic situation of the city industrial sector (the “present situation of the industry”, as translated from the considerations of the Resolution).

Another issue in which the IADB affected was the inspection strategy of the IMM. On one hand, the number of inspections performed by the IMM on industrial plants peaked in months of 1997 and 1998 corresponding to special, IADB-financed, monitoring campaigns. On the other hand, the Monitoring Program that was performed by a private consulting firm between 1999 and 2001 crowded out IMM inspections.

With respect to the DINAMA monitoring and enforcement policy, simple analysis of the data does not support the story about the IMM being in charge of continuous compliance and the DINAMA in charge only of initial compliance. There is no clear relationship between those plants most inspected by the DINAMA and those that incorporated abatement technology during the period. It looks like, even after controlling

⁸ In July 1997, first month of our sample period, 76% of the levels of BOD₅ reported by the firms were above the emissions standards.

⁹ Resolución Municipal N° 761/96, Plan de Reducción de la Contaminación de Origen Industrial, February 26th, 1996.

for special campaigns conducted by the DINAMA and NGOs (possibly as a result of some external funding availability), the DINAMA was also interested in assessing continuous compliance. It is true though that the DINAMA inspected less than the IMM.

2.4 Results

With very few exceptions, ambient water quality of the three major water streams in Montevideo worsened in the period between the early 1990s and 2001, the period for which inspections data is available.¹⁰ Furthermore, with the exception of chromium and BOD₅ concentration levels in the Carrasco stream and lead concentration levels in the Miguelete stream, none of the pollutants concentration levels comply with the ambient standards (never formally ratified) for streams crossing urban areas at their outfalls. Nevertheless, this decrease in the water quality could have taken place even with decreasing industrial emissions because of the exponential growth of irregular settlements in Montevideo during the nineties.

The evolution of the average discharge of emissions of BOD₅ shows a more irregular trend. As measured by kilograms of BOD₅, they decreased 57% between December 1996 and November 2001 but only 20% with respect to November 1997. Even more, in July 1999 they reached levels 53% higher than those in November 1997. The evolution of the average discharge of Chromium shows a larger percentage decrease (76%) and a clearer downward trend during the same period. Emissions of BOD₅ and chromium also appear to bear a relation to inspections. In particular, they decreased in 1997 when the number of plants monitored by the IMM increased, they increased in 1999 when inspections decreased, and they decreased again in 2000 when the IMM increased

¹⁰ This section is based on Caffera (2004), Chapter 3, where a detailed illustration of the results commented here and a more detailed explanation of the data sources are provided.

the number of inspected plants. Violations to emissions standards during this period of available data were frequent. Nevertheless, although in excess of the emissions standards, the average reported level of BOD₅ concentration in emissions concentrations has tended to decrease and the plants' emissions have tended to cluster around the standard. This evolution is consistent with the actual objective of regulators, which according to interviews held, was not necessarily to increase compliance by getting the plants to emit below the standards, but to decrease the amount of violations, that is the difference between the level of the BOD₅ reported and the level of the BOD₅ emission standard.

3. WHY URUGUAYAN REGULATORS OPTED TO CONTROL INDUSTRIAL WATER POLLUTION WITH COMMAND AND CONTROL INSTRUMENTS

The main purpose of this section is to give reasons that may explain why Uruguayan regulators have chosen uniform emissions standards instead of more cost-effective economic instruments to control industrial water pollution in Montevideo. The section is organized as follows. I first present the standard argument in favor of economic instruments. I then review the arguments behind the answers given by the economic literature on the puzzle of cost-ineffective instruments choice in less developed countries. Finally, I evaluate their relevance for the case of industrial water pollution control in Montevideo.

The issue that motivates this paper is that the instruments chosen by Uruguayan regulators do not rank well in terms of several criteria that can be used to judge policy instruments. To start with, the instruments are *cost- ineffective*. That is, they do not minimize the aggregate costs of achieving the environmental quality goal. This criteria alone explains the movement towards economic instruments in US environmental policy

over the last 30 years (particularly in air pollution control), and the similar movement in the EU climate change policy.

Yet, uniform emissions standards also rank poorly according to other criteria that can be taken into account when selecting instruments for pollution control. (See Böhm and Russell (1985) for a review of these criteria) The instruments chosen by Uruguayan regulators are *information and computation intensive*. Both the uniform concentration emission standards and the obligatory adoption of abatement technology impose large information gathering and computation requirements for regulators. They are not among the less *costly* instruments in terms of *monitoring and enforcement*, either. 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 also on a relatively continuous basis 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. In this sense, Uruguayan uniform effluent concentration standards may require more monitoring resources than the conventional economic instruments because they not only target end-of-pipe emissions, as direct economic instruments do, but also the presence and correct operation of the abatement technology.

Another problem with the Uruguayan norms is that they are *not flexible in the face of economic changes*. If production levels, technology or the number of firms change, the instrument does not automatically adjust to meet the environmental quality targets. Instead, the regulator needs to obtain new information and perform new calculations to ensure that the targets are being achieved under the new conditions.

Another disadvantage of uniform emission standards operating in Uruguay is that they *do not create incentives to abate emissions beyond the standards*. Quite the contrary, concentration standards induce the dilution of effluents in clean water, paradoxically leading to an inefficient use of the resource being protected by the legislation. As every emissions standard or technology standard, they do not provide *incentives to reduce emission levels in the long run*, for example, by updating abatement technology. Regulators must adjust standards as the only way to improve environmental quality in the long run.

In sum, the instruments chosen by Uruguayan policy makers rank very poorly in terms of cost-effectiveness, have high information requirements for regulators, are not relatively easy to monitor and enforce, and provide no incentive to abate emissions beyond the standard, neither in the short run nor in the long run. Given that countries like Uruguay should be interested in the implementation of cost-effective instruments in order to save scarce resources and avoid further compromising economic development possibilities, the present choice becomes a puzzle. The next sections explore some of the answers that the economic and law literature have provided to this puzzle. Finally, based on my field research, I also suggest other possible answers that this literature, in my view, does not put adequate emphasis on.

3.1 The Political Economy of the Choice of Policy Instruments

Why have command and control instruments been used more frequently than incentive-based instruments despite the cost-effective advantage of the latter? Why have incentive-based instruments begun to gain acceptance in recent years? Drawing from the

US experience, Keohane, et al. (1998) provide plausible answers for these two questions, which are useful to summarize in order to later analyze their relevance for Uruguay.¹¹

According to the positive political economy, instrument choice is an equilibrium outcome of the “political market” operating through given institutional mechanisms. The demand side of the market includes several interest groups: polluting firms, environmental organizations, workers and consumers.¹² The supply side of the market is assumed to be composed of legislators, who seek to assure re-election. They are therefore willing to trade some effective support for a given environmental policy instrument in exchange for votes and/or monetary contributions.

Using this model, the question of why command and control instruments are more commonly used can be answered by examining the incentives of each of the aforementioned interest groups. Profit maximizing firms demand those policy instruments that minimize their costs of compliance. In general, firms will prefer standards to emissions charges because under the former they only incur in abatement costs (and possibly non-compliance costs), while under a system of emissions charges firms also pay a certain amount for every unit emitted.

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. They depend also on the process by which permits are allocated. Would-be net

¹¹ It is interesting to note that in these two aspects the US experience does not differ from Uruguay's, or other less developed countries, for that matter.

¹² These are not mutually exclusive categories, of course. Every worker is a consumer, for example.

sellers firms may prefer grand fathered permits to emissions standards. Auctioned permits will generally be opposed by most firms when compared to emissions standards.

Environmental regulations create costs that firm managers and owners use to pressure governments with the possibility of lost jobs. Unions tend to defend jobs. Consequently 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 and when damages are uncertain and dispersed.

Environmental organizations may also prefer standards to taxes or tradable permits or taxes because the latter may be seen as licenses to pollute. With respect to citizens and consumers broadly, even assuming they are perfectly informed 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, one should not expect consumers or citizens, defined in general terms, to lobby on the issue of instrument choice.

From the supply side of the “political market”, some of the explanations the literature has proposed for the prevalence of command and control instruments over incentives are the following. First, politicians may prefer instruments for which the costs of regulation are less visible. This is not the case for charges and tradable permits. Second, politicians often engage in “symbolic politics” and command and control 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 to oppose economic instruments are that they are not familiar with them, economic instruments may not require the same technical expertise that agencies need under command and control instruments and that incentive – based instruments shift control decisions from regulatory staff to polluting firms, possibly affecting their prestige and job security.

3.2 Lack of Institutional Capacity in Less Developed Countries

A second answer that the economic literature has given to the puzzle of cost ineffective instrument choice comes from a fairly recent literature that states that even assuming that environmental policy makers in less developed countries are committed to implementing economic instruments, the informational burden that these instruments pose on regulators clashes with the lack of institutional capacity of these countries, making the implementation of these instruments impossible in the short run. (Russell and Powell, 1996). Examples of what is meant exactly by lack of institutional capacity are: (a) overlapping jurisdictions between different uncoordinated offices in charge of environmental regulation; (b) understaffed environmental agencies; (c) inadequate monitoring technology; (d) slow legal processes and a small number of judges and attorneys qualified in environmental law; (e) lack of experience with economic instruments for environmental protection, and (f) tight public budgets. The main result of this lack of institutional capacity is the inability to implement parallel monitoring and

enforcement strategies in order to attain some “good” level of compliance when applying economic instruments. The cost of administering these programs can be a very high price to pay for less developed countries. 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 have agreed with this conclusion (Barbe, 1994; CEPAL, 2000 and 2001; Eskeland and Jimenez, 1992; O’Connor, 1998; Seroa da Motta, et al, 1999). Some have also proposed alternative indirect economic instruments. Examples of these include: taxes on consumption goods or production inputs (Eskeland and Devarajan, 1995), taxes on complements (or subsidies on substitutes) of polluting goods; combinations of indirect taxation and command and control instruments (Eskeland, 1994); import quotas on polluting goods or inputs (O’Connor, 1998), voluntary agreements on pollution abatement between the government and polluters (O’Connor, 1998), and public disclosure of the environmental performance of firms (Pargal and Wheeler, 1996; World Bank, 1999).¹³

¹³ On the issue of the lack of enforcement capacity of regulators, Tietenberg (1996) has suggested creating mechanisms to ease what he called the private enforcement of environmental regulations.

3.3 Relevance of These Two Explanations for the Case of Industrial Water Pollution in Montevideo

In this section I subject these arguments to empirical validation for the case of industrial water pollution in Uruguay through a detailed case study of the legislative decision-making process and institutional capacities.

3.3.1. Past and present institutional capacity

In some aspects, the institutional capacity of Uruguay with respect to environmental policy in the late sixties or the beginning of the seventies, when the Uruguayan municipal norms controlling industrial effluents were born, was not very different from other developed countries like the US. The capacity and the technology required for economic instruments were simply not there at that time. For this reason, the command and control regulatory approach taken by both the US and Uruguayan regulators at that time can be seen as correct in terms of institutional compatibility.¹⁴

Although the idea of taxing externalities was known to economists since the seminal work of Pigou in 1920, environmental economists were just starting to propose tradable permits as an instrument for pollution control in 1968 with the work of Dales. There is some evidence that the US legislators knew the idea of taxing emissions in 1970 when the Clean Air Act was passed, and that they considered this idea, but it was discarded in favor of technology-based emissions standards precisely because of capacity

¹⁴ Interestingly enough, environmental economists have only very recently started to pay attention to the validity of the argument stating the cost-effective superiority of economic instruments when monitoring and sanctioning costs are taken into account. Although the results so far are mixed, and it is beyond the scope of this footnote to discuss why, the asymmetric information problem that an effective enforcement strategy faces in the case of uniform emissions standards gives tradable permits an advantage that so far has proven difficult to beat. (See Malik (1992), Chavez, Villena and Stranlund (2008)).

reasons (see Cole and Grossman (1999)). There is no such evidence for the case of Uruguayan regulators at that time. In spite of this, one can hardly blame them for choosing command and control instruments instead of economic instruments in 1968.

Moreover, the technology to monitor emissions on a continuous basis did not exist at that time. This may explain why municipal regulators in Uruguay in 1968 and federal regulators in the US in 1972 (with the Water Pollution Control Act Amendments) set technology-based effluent standards, but focused the enforcement of the legislation on the presence and correct operation of the treatment plant or abatement technology. Third, federal and state offices in the US were under-staffed (see references in Cole and Grossman (1999)), and so was the Industrial Effluents unit of the municipal government of Montevideo at that time, with just two persons in charge.¹⁵

But Uruguay was not like the US in other more fundamental aspects beyond these similarities, of course, and these differences may help explain the radically different evolution of environmental policy in the two countries since 1970. First, the US created the EPA in 1970, while Uruguay did not create a similar office until 1990. Second, the US was already a developed country in 1970. This means, among other several things, that the federal government had more budget to, for example, provide “sizeable training grants to academic institutions during the late 1960s and into the 1970s” to meet the demand for environmental protection agents (Cole and Grossman (1999), pg.920). Third, while there is no evidence that Uruguayan regulators were aware of economic

¹⁵

It is important to note that under-staffing is difficult to determine beyond some basic administrative personnel. This is so because the number of inspections (and inspectors) necessary to enforce a norm depend on the size of the penalties relative to the cost of compliance.

instruments at the beginning of the 1970s, the EPA began to introduce economic instruments as soon as 1972, according to the same authors.

Finally, and perhaps most important, while in the US “the national consensus” to legislate in favor of environmental protection “dissolved with the appearance of the economic downturn and energy crisis of the early 1970s” (Marcus (1991), cited by Cole and Grossman (1999), pg.922), in Uruguay what happened in the following years was much more dramatic than that. Between 1955 and 1968 Uruguay experienced what is generally called the collapse of the economic model based on import substitutions. Between those years, the GDP per capita decreased 13.2%, after 55 years of modest but steady increase. The purchasing power of salaries decreased 13.9% during the same period. (Prices for consumers increased forty-eight-fold). In December 1967 the inflation rate reached 136%. In 1968 the government froze salaries and prices, and started to regulate them heavily. This measure increased the already present social unrest. Because of this, the government issued special internal security measures. These were maintained until the fall of the democratic institutions in 1973 and throughout the dictatorship that lasted until 1985.

In the light of these dramatic events of the political and economic history of Uruguay between the late sixties and the middle eighties, it is not very difficult to understand why Uruguayan environmental policy stagnated while the US, for example, invested heavily in its monitoring capacity (both in ambient quality and point-source emissions technology) and staffing, both at the EPA and state and local governments between 1970 and 1977. With some previous experiences in emission permits trading with mixed successes (see Hahn (1989)), the US ended up implementing the first federal

cap-and-trade emissions control program in 1990 (with the Clean Air Act Amendments of that year), five years after Uruguay recovered democracy. In the same year, 1990, Uruguay created its Ministry of Housing, Zoning and the Environment (Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente) and its National Office of the Environment (Dirección Nacional de Medio Ambiente, DINAMA), the Uruguayan counterpart of the USEPA.¹⁶

It is true though that, at least in theory, the military regime could have developed environmental institutions. In fact, the Water Code (Decree – Law # 14859 of 1978), the Superficial Waters and Soils conservation for agricultural purposes Law (# 15239 of 1981), and the above mentioned decree establishing effluents and ambient standards nationwide (Decree 253/79 of 1979), were all passed during the military regime. But the institutional innovation with respect to pollution control did not go beyond these norms. It did not move toward economic instruments, for certain.

Several hypotheses can be elaborated on this issue. First, for obvious reasons, people were more interested in obtaining back lost basic rights than in environmental degradation. Second, even if ordinary people could have been interested in environmental issues, they could not vote or express their preferences; the government had zero accountability. Third, the environmental quality was not as bad as in the US. The

¹⁶ Although the argument is more general, it is a valid caveat to say that the US experience with water pollution has also clashed with barriers when trying to apply economic instruments. According to the international experience, tradable permits seem to perform better with air pollution than with water pollution. Part of the problem could be that in the case of water pollution the point of emissions matters. Although this is also true at with air pollution (and this is why we have trading zones in the case of the RECLAIM program in Los Angeles), the problem seems to impose more regulatory burden (implementation costs) in the case of water pollution (See for example Hahn, 1989).

population density in Uruguay is relatively low and the economy was not growing.

Fourth, the military government did not perceive or, most probably did not know, that the environmental problems on which they legislated could be a matter for economists.

As a final hypothesis, while in the US economists in the academia and other think tanks continued to produce papers and reports whose conclusions favored the implementation of economic instruments, which could have influenced the view of the Congress and the increasing number of economists and others working at the EPA, the Uruguayan economics academia did not follow that path. The University of the Republic, the only university until 1975, was intervened by the military government in 1973. Professors identified with the left were incarcerated and/or fired, and an unknown but large number migrated to other countries. None of the remaining economists developed the field of environmental economics during those years. As a result, there were no environmental economists in Uruguay at the end of the sixties and this situation did not change in the seventies and early eighties.

The lack of a well developed field of environmental economics may be an important factor to explain differences in instrument choice among countries. Chile is a country that has characterized for giving (pro free-market) economists a prominent role in the government during the Pinochet regime. The issue has not been studied, but maybe not as a coincidence Chile was one of the first, if not the first, among the less developed countries, to implement a cap-and-trade program to control air pollution. The program, named the Emissions Compensation Program, was designed to control total suspended particles emissions from fixed industrial sources in Santiago. It is worth noting that the norm establishing the Program is from March 1992 (Supreme Decree No. 4) and the

program started in 1993 (See Palacios and Chavez (2005) and the citations therein for references). That is, the Chilean cap and trade program is contemporaneous to the US 1990 amendments to the Clean Air Act that established the Sulfur Dioxide (SO₂) Allowance Trading Program, whose Phase I started in 1995, and to the Regional Clean Air Incentives program (RECLAIM), which started in 1993 (Chavez, 2000).

It is worthwhile to observe, however, that Chile's Emissions Compensation Program was not a complete success. The program was characterized by a reduced number of transactions and by significant percentages of non-compliant sources during its first 4 years (1993 – 1996), although noncompliance decreased significantly in the following three years (1997 – 1999), last year of information. It is hypothesized that the latter was the result of the availability of cleaner natural gas in the Santiago area in 1997, more than the result of an effective monitoring and enforcement strategy from the part of regulators (Palacios and Chavez, 2005). This experience contrasts drastically with the historical almost 100% compliance rate of the US Acid Rain Program (See EPA (2005), for example). It has been acknowledged that this success was due to the availability of continuous monitoring technology and a rigorous tracking of allowance trading. This continuous monitoring was not a characteristic present in the design of the Chilean program. In this sense, it can be said that only the presence of environmental economists to advise willing-to-listen governments does not assure a successful implementation of economic instruments.

But perhaps what is more surprising with respect to the Uruguayan institutional capacity and its (lack of) experience with economic instruments is not the past situation but the present one. First, there is an important problem of overlapping jurisdictions

between uncoordinated offices: the Industrial Effluents Unit of the Municipal Government (IMM) and the Environmental Control Division of the Ministry of the Environment (MVOTMA). Consequently, regulatory boundaries remain blurred and offices compete for regulatory power and public budgets, all of which undermines coordination. As said above, the problem may have its roots in the evolution of the regulation from the municipal level to the national level, under the presence of a severe lack of resources in the new Ministry of the Environment that makes it impossible to completely swap responsibilities in practice. There have been some attempts to overcome these difficulties. In 1995, possibly because of budget constraints, the IMM and the DINAMA verbally agreed that the IMM would be in charge of continuous monitoring in Montevideo so that the DINAMA could save monitoring resources and increase the frequency of inspections in the rest of the country.¹⁷ This division of tasks was efficient a priori, but it required communication and coordination, which were mostly absent. For example, these two offices rarely shared information.

Another expression of the lack of “institutional-capacity” is staffing at both offices. Seven people work at the Industrial Effluents Unit of the municipal government, including the Director. All of them participate in inspections in one way or another. These same people are the ones that enter the data with the results of sample inspections and the reported levels of pollution by firms. The rest of the information (production, inputs used, orders, and fines) is left on paper. Furthermore, all of these persons have another job apart from the one at the IMM to complement their wages. All of these

¹⁷ Gudynas (1996) pointed out that in 1995 the Ministry of the Environment suffered budget cuts and that the monitoring tasks were very affected by these cuts. Since January 1995 the DINAMA had to suspend inspections due to “lack of vehicles and gasoline” (pg. 8).

factors severely hinder long run planning and analysis. Worse circumstances prevail in the DINAMA. Only five persons work in this office, which are not only in charge of the monitoring and enforcement of water pollution legislation, but all national environmental legislation.

With respect to the institutional capacity outside the government sphere, the Justice system is still “immature” (M. Cousillas, legal advisor for the DINAMA, personal conversation). The number of precedents on environmental issues is very low. This is due basically to a general culture of very low litigation (for reasons that go beyond the scope of this research) and the fact that the environmental issue is new. Attorneys did not receive formal education in environmental law, because this discipline has only recently been incorporated in law school programs. In fact, there are very few attorneys qualified in environmental law in Uruguay.

It is difficult to weigh which of these institutional constraints is more important to explain why, contrasting with other Latin American countries such as Chile and Colombia, Uruguay has not yet experimented with economic instruments to protect the environment. Several of these constraints prevent not only the implementation of economic instruments but also the correct functioning of command and control type of instruments. Particularly those that, like the emissions standards applied in Uruguay, target end-of-pipe emissions levels, as tradable permits or emissions taxes do. Nevertheless, one institutional constraint that explains instrument choices and has not been emphasized in the literature is a very basic one: the presence of environmental economists. Perhaps not the result of a coincidence, the most prominent regulatory approaches based on economic instruments of South America (the Emissions

Compensated Program in Santiago, Chile, and Colombia's Discharge Fee Program (*Tasas Retributivas*) are hosted in the same two countries that were the only ones hosting academic programs in environmental economics, until very recently¹⁸. The need of environmental economists in universities, regulatory staffs and other key areas of environmental policy seems to be a major capacity constraint in these countries, one that has not been adequately emphasized in the literature.

3.3.2. The Case of the Proposed Emissions Charges of 1995

With respect to the political economy arguments, without analyzing a concrete experience one can only hypothesize about the role that actors on the demand or the supply side of the political market could play. This is the reason why I analyze the 1995 experience with proposed emission charges below.

The only experience with direct economic instruments that Uruguay has had to date is its proposed but failed 1995 experience with effluent charges.¹⁹ In that year, the IMM approved the creation of emissions charges for those industries with effluent concentration levels larger than the emissions standards. In fact, this was not an emissions charge in the classical 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

¹⁸ The situation has worsened. As far as I know, Chile is now the only country in the continent hosting academic programs in environmental economics.

¹⁹ Articles 42 to 45 of the "Decreto de la Junta Departamental N° 26.949", December 14th, 1995.

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 Uruguayan Constitution, by which (at least a thousand) citizens can present a petition for such a 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. 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 only the national government can create, 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. And they succeeded.²⁰

Although there is no formal evidence, personal interviews held during my field research point to the hypothesis that the idea of implementing effluents charges in 1995 was borne at the Inter American Development Bank, and not at the municipal government of Montevideo. The available pieces of evidence do not conduct to the rejection of this hypothesis. First, there is no proof that the support for economic instruments had grown inside the municipal government or the national congress, as it did for example in the US, as the institutions and technology to successfully implement them grew over time. In fact, there was no economist working at the municipal or national government in these issues at that time. Second, neither the municipal government nor the legislators in favor of them defended the effluents charges in terms of an economically sound instrument to internalize an externality. Instead, and surprisingly, they only argue that they were not designed to collect fiscal revenues, as maintained by the legislators that opposed the charges.

Apart from this respect, what the Uruguayan experience with these effluent charges shows is not different from what may have happened previously in more advanced countries. It can be seen that the industry opposes taxes, legislators maximize votes, and workers and consumers did not participate much in the debate. With some

²⁰ 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).

exceptions, the same can be said for environmental NGOs. These are results that the literature predicts in general, and possibly more in a country like Uruguay, with a larger percentage of the population with unsatisfied basic needs.

4. CONCLUSIONS

The Uruguayan industrial water pollution control experience shows that legislators and policy makers in less developed countries such as Uruguay could be more interested in creating jobs than protecting the environment. This could be an unsurprising result, since a large percentage of the population in countries like Uruguay live under harsh conditions. Nevertheless, political economy factors like this hinder the successful implementation of economic instruments for protecting the environment. The situation is worsened by the lack of institutional capacities, some of which may be the other side of the coin. Nevertheless, one of the most important institutional constraints in less developed countries can be the lack of economists trained in environmental issues in general and instruments for environmental policy specifically, that can convince legislators and policy makers, for example, that applying indirect economic instruments may be a more effective way of protecting the environment in terms of environmental quality, costs and incentives. The task is not easy.²¹ But cost – effective environmental protection will be more difficult to reach without local environmental economists working in these countries to advise policy makers about their merits. This is a task that

²¹ One thing that may play a role on the issue of instrument choice and that was not mentioned in this paper is ideology. Right-wing legislators could tend to favor economic instruments because they are market or incentive - based, and left-wing legislators could tend to disregard them. As the 1990s pro – market reforms tend to foster economic instruments in several countries last decade (Seroa, et al (1998)), the contrary could be happening in the 2000s with the new political scenario.

economists are now more prepared to do correctly than in the past, when economic instruments were fostered disregarding enforcement costs. Building this capacity and solving social problems will take time. Alternative faster ways to do it could be through international aid or advice. But the Uruguayan experience has shown that this could fail. It will be necessary for multilateral aid agencies and other international organizations to take the political, institutional, and economic local characteristics more into account than in the past if a successful implementation of economic instruments is to be expected.

5. REFERENCES

- Barbe, J. P. (1994). "Economic Instruments in Environmental Policy and their relevance to Developing Economies". Technical Paper No. 92, OECD.
- Blackman, A. and W. Harrington. (2000). "The Use of Economic Incentives in Developing Countries: Lessons from International Experience with Industrial Air Pollution". *Journal of Environment and Development*, 9 (1), 5 – 44.
- Böhm, P. and C. S. Russell. (1985). "Comparative analysis of alternative policy instruments", in *Handbook of Natural Resource and Energy Economics*, Vol. I, A.V. Kneese and J.L. Sweeney. (Eds.), Elsevier.
- Caffera, M. (2004). "The Implementation and Enforcement of Environmental Regulations in a Less Developed market economy: evidence from Uruguay", Ph.D. Dissertation, Department of Resource Economics, University of Massachusetts – Amherst.
- Caffera, M (2007). "The effectiveness of the enforcement of industrial effluent standards in Montevideo, Uruguay". Unpublished manuscript.
- CEPAL (Comisión Económica para América Latina y el Caribe). (2000). "Instrumentos económicos para el control de la contaminación del agua: condiciones y casos de aplicación" (Versión preliminar), LC/IN. 137.
- CEPAL (2001). "Aplicación de Instrumentos Económicos en la Gestión Ambiental en América latina y el Caribe: desafíos y factores condicionantes", *Serie Medio Ambiente y Desarrollo* 31, Santiago de Chile.
- Chávez, Carlos. (2000). "Enforcing Market-Based Environmental Policies". Doctoral Dissertation, Department of Resource Economics, University of Massachusetts – Amherst.
- Chávez, C., M. Villena y J. Stranlund. (2008). "The Choice of Policy Instruments to Control Pollution under Costly Enforcement and Incomplete Information". Unpublished working paper.
- Cole, D. H. and P. Z. Grossman. (1999). "When is Command and Control Efficient? Institutions, Technology, and the Comparative Efficiency of Alternative Regulatory Regimes for Environmental Protection". *Wisconsin Law Review* 1999, 887 – 938.

- Dwyer, John P. (1990). "The Pathology of Symbolic Legislation" *Ecology Law Quarterly* **17**, 233 - 281.
- Eskeland, G. S. and E. Jimenez. (1992). "Policy Instruments for Pollution Control in Developing Countries". *The World Bank Research Observer*, **7** (2), 145-169.
- Eskeland, G. S. (1994). "A Presumptive Pigouvian Tax: Complementing Regulation to Mimic an Emission Fee". *The World Bank Economic Review*, **8** (3), 373-394.
- Eskeland, G. S. and S. Devarajan. (1995). "Taxing bads by taxing goods: toward efficient pollution control with presumptive charges", in "Public Economics and the Environment in an Imperfect World", Bovenberg, L. and S. Cnossen, eds., Kluwer.
- Funk, P. (2004). "Is there an expressive function of law? Unpublished working paper.
- Gudynas, E. (1996). "Economía Política de la Tasa de Sanearamiento". *Temas Clave* N° 3, Junio, Centro latinoamericano de Ecología Social.
- Hahn, Robert. (1989). "Economic Prescriptions for Environmental Problems: How the Patient Followed the Doctor's Orders". *Journal of Economic Perspectives*, **3** (2) 95 – 114.
- Intendencia Municipal de Montevideo. (2000). "Agenda Ambiental Montevideo 2000". (<http://www.montevideo.gub.uy/ambiente/documentos/agenda2000.pdf>)
- Intendencia Municipal de Montevideo. (2002). "Segundo Informe Ambiental". (<http://www.montevideo.gub.uy/ambiente/documentos/agenda2002.pdf>)
- Intendencia Municipal de Montevideo. (2002). "Informe Ambiental 2003" (<http://www.montevideo.gub.uy/ambiente/documentos/agenda2003.pdf>)
- Instituto Nacional de Estadística. (2003). "Estimaciones de Pobreza por el Método del Ingreso. Año 2002", (<http://www.ine.gub.uy/biblioteca/pobreza/ECH%202002-Pobreza.pdf>)
- Keohane, N. O., R. L. Revesz and R. N. Stavins (1998). "The Choice of Regulatory Instruments in Environmental Policy". *Harvard Environmental Law Review*, **22** (2), 313-367
- Keohane, N. O., R. L. Revesz and R. N. Stavins (1997). "The Positive Political Economy of Instrument Choice in Environmental Policy". *Resources for the Future Discussion Paper 97-25*, Resources for the Future, Washington, DC.
- Malik A. (1992). "Enforcement Costs and the Choice of Policy Instruments for Controlling Pollution". *Economic Inquiry* **30**, 714-721.
- Multiservice – Seinco – Tahal. (2001). "Informe Resumen sobre la Calidad de los Cuerpos de Agua de Montevideo". Unpublished report.
- Palacios, Milagros y Carlos Chávez. (2005). "Determinants of Compliance in the Emissions Compensation Program in Santiago, Chile", *Environment and Development Economics*, **10** (4), 453-483.
- Pargal, S. and D. Wheeler. (1996). "Informal regulation of industrial pollution in developing countries: evidence from Indonesia". *Journal of Political Economy*, **6** (104), 1314 - 1327.
- O'Connor, D. (1998). "Applying economic instruments in developing countries: from theory to implementation". *Environment and Development Economics*, **4**, 91 – 100.

- Russell, C. S. and P. T. Powell. (1996). "Choosing Environmental Policy Tools, Theoretical Cautions and Practical Considerations", IADB No. ENV-102, Washington D.C.
- Seroa da Motta, R., R. M. Huber and H. J. Ruitenbeek. (1999). "Market based instruments for environmental policy making in Latin America and the Caribbean: lessons from eleven countries". *Environment and Development Economics*, 4; 177-201.
- Tietenberg, T. (1996). "Private Enforcement of Environmental Regulations in Latin America and the Caribbean. An Effective Instrument for Environmental Management?" No. ENV – 101, IADB, Washington, D.C.
- USEPA. (2005). Acid Rain Program 2005 Progress Report.
(<http://www.epa.gov/airmarkt/progress/arp05.html>)
- World Bank, "Greening Industry: New Roles for Communities, Markets and Governments", Washington D. C. (1999).