

Title of the Project: Testing the Effectiveness of Enforcing Industrial Pollution Regulations in Montevideo, Uruguay

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1. INTRODUCTION AND OBJECTIVE

Enforcement of regulations controlling emissions is crucial. Environmental sustainability will not be achieved if the norms restricting agents' actions towards the environment are not enforced. This may be particularly a determinant issue in Latin American countries, where regulators may not have enough budget to build the capacity to do the necessary enforcement. Unluckily, there is not sufficient sound empirical work done on the effectiveness of regulators' enforcement measures in the region. Consequently, we cannot measure how effectively we, Latin-Americans, are using our scarce resources and compare alternative enforcement mechanisms (formal vs. informal, for example) or instruments (command and control vs. incentive-based, for example). One of the reasons that explains this situation is the lack of adequate data on emissions and enforcement measures (inspections and fines), which is probably the result of the same lack of resources. This is not the case in Montevideo, Uruguay. Here, the municipal and national governments keep good records on the level of emissions, production, inputs used, and enforcement measures. The purpose of this research project is to use these data to test the effectiveness of the enforcement measures on the compliance status of industries in the city with emissions standards.

2. RELEVANCE FOR THE REGION

In spite that several authors have acknowledged the lack of institutional capacity in less developed countries to enforce environmental regulations (see Eskeland and Jimenez, 1992; Tietenberg, 1996; Russell and Powell, 1996, O'Connor, 1998; Blackman, and Harrington, 2000)¹, there is a large disparity in the number of comprehensive empirical studies analyzing the effectiveness of environmental regulators' enforcement activity in developed and less developed countries. To my knowledge, the only examples of published papers for a less developed country that use a comprehensive database on emissions and enforcement actions are Dasgupta *et al.* (2001), Wang *et al.* (2003) and Wang and Wheeler (2005). The studies done on Latin America are cross-section studies without information on either emissions (Blackman and Bannister (1998), Dasgupta, et al. (2000), Coronado (2001), Cruz and Uribe (2002), Ferraz, et al. (2003), Otero (2002), Gangadharan (2006)) or enforcement activities (Palacios and Chavez, (2005)). To my knowledge, there is no published work that uses time series data on emissions, inspections and fines on a Latin American country. As said above, this gap constitutes an obstacle for the design of effective environmental policy in Latin America.

The proposed research is a continuation a previous one (Caffera, 2007). The conclusions reached in this work were negative: Uruguayan regulators' inspections and fines were ineffective in increasing compliance of industries with emissions standards. Nevertheless, the study period was a very special one. During this period, the Municipal Government of

¹ See Caffera (2007) for the references mentioned in this proposal.

Montevideo implemented the Industrial Pollution Reduction Plan with funds from the Inter-American Development Bank to increase compliance. As part of this plan, emissions standards were relaxed to give plants time to invest in abatement technology. Also, during the Plan period the Uruguayan industrial sector experienced one of its more severe crises in history. Because of these facts, the results obtained from my past work cannot be generalized to different situations, possibly more common or “normal”. This is the reason why this new proposed research in Montevideo, Uruguay, is worth pursuing. The availability of data makes it a unique opportunity to do empirical research on this issue that can be used to extract helpful conclusions for the region (valid not only for a specific period and place) regarding the relationship between institutional capacity and the design of environmental policy.

3. BRIEF OUTLINE FOR THE RESEARCH METHODOLOGY

With the assumption that the level of emissions of an industrial firm is the result of a balance between marginal benefits and marginal costs of pollution, the hypothesis will be tested running a dynamic panel data model with pollution as the dependent variable. Pollution will be measured as mg/l of Biological Oxygen Demand (BOD₅) in the firm’s effluents. BOD₅ is a measure of organic pollution, one of the most important forms of pollution of the city streams. This information is taken from the monthly reports that the industrial plants send to the Municipal Government of Montevideo. This report includes not only information on BOD emissions but also on other types of pollution, as well as level of production, employment, energy used and water consumed. These variables, along with the product price, will be the right-hand side variables representing the value of the marginal product (the marginal benefit of pollution). This is the approach of pollution as an input of production. There is another approach to specify the pollution equation to estimate. This is the abatement cost approach. In this approach the cost of pollution is the difference in (maximum) benefits with different levels of pollution. Following this approach requires estimating the pollution equation with the relevant prices of inputs and outputs as explanatory variables. This approach will be pursued also. The other important explanatory variables will be inspections and fines from regulations. These will represent the expected penalty of pollution (marginal cost). This information is taken from the municipal and national governments’ records.

The data set covers the period July 1997 – February 2008 and between 70 and 80 industrial plants in the city of Montevideo, Uruguay. The panel is unbalanced due to missing data (non – reports) and attrition is present since new firms appear and other close. All information is monthly.

Endogeneity of inspections is an obvious potential and important problem in this type of empirical research. I will treat the data as a system of equations, with inspections and emissions jointly determined, to tackle this problem.

4. REFERENCES

Caffera, M. (2007). “Financial assistance of multilateral aid agencies to enforce environmental regulations: is it effective?”. Unpublished working paper.