

# **The Fiscal Imperative and the Role of Public Prosecutors in Brazilian Environmental Policy**

## **1. Introduction**

One cannot understand the formulation, application and impact of environmental policy in Brazil today without explicitly considering public prosecutors as one of the key players, directly and indirectly responsible for a large part of the incentives and constraints faced by other actors such as businesses, government agencies and social movements. In the years since the passage of the Brazilian Constitution of 1988, public prosecutors have evolved from their traditional role of merely prosecuting those who commit crimes, into political actors that play a much wider role in several policy areas, including a central role in environmental policy (McAllister 2008a).

Although the evolution of the *Ministério Público* in the past decades has been remarkable, it is by no means an isolated event. Political institutions in Brazil have undergone an intense process of change since the 1980s with the evolution of the public prosecutors merely a part of that overall movement (Alston, Melo, Mueller and Pereira, 2008). Inflation, once endemic, came under control; the external debt was settled; democracy was consolidated with real alternation of power; governors lost much their influence at the federal level (Melo 2002); political parties became more disciplined and institutionalized (Amorim Neto 2002); and wealth concentration started reverting after 500 years resisting all attempts at redistribution (Barros et al. 2006).

The purpose of this paper is to explain how public prosecutors affect the environmental policy process and to use available data to provide support for the claim that their impact on environmental policy is positive. The basic argument is as follows. The main characteristic of the general policymaking process is the dominance of a fiscal imperative that leads the President to use his/her substantial powers to pursue monetary stability and fiscal responsibility (Alston, Melo, Mueller and Pereira 2008). The fiscal imperative means that all other policy areas, including environmental policy, will only be attended to if the macroeconomic constraint permits. However, the significant involvement of public prosecutors works as a countervailing constraint that impedes the President from simply pushing environmental policy to the sidelines. An analysis of available data suggests that their involvement in environmental policy leads to welfare gains for society.

The second section of the paper introduces the Brazilian prosecutors, with a description of the powers, preferences, motivations, and *modus operandi*. The section that follows describes the general characteristics of environmental policy, showing that it is highly institutionalized and visible yet has often been uncoordinated, volatile and ineffective. The fourth section presents the heart of the argument, showing how environmental policy in Brazil involves a clash between independent, resourceful and zealous prosecutors and a preponderant federal Executive in the shadow of electoral sympathy for environmental issues, and setting forth the characteristics of the policymaking game which ensues. The fifth section presents a model of the prosecutors' role as enforcers of environmental policy which is followed by a section that presents a quantitative analysis designed to determine whether the role of public prosecutors in environmental policy actually leads to welfare gains for society or whether they simply distort policy implementation or even aggravate the situations they address.

## **2. The History, Structure, Preferences, Motivation, Resources and Instruments of Public Prosecutors in Brazil**

The fundamental role of public prosecutors in determining the form and impact of environmental policy (as well as many other policy areas) is a relatively recent development, dating from legal and political changes in the 1980s (McAllister 2005, 2008a; Arantes 1999, 2004; Sadek 1997; Sadek and Lima 2006). Although most countries have public

prosecutors, in Brazil they play a particularly important role in shaping public policy. The country's political institutions give the prosecutors the independence, the legal instruments and the resources, which allow them to be an extremely active watchdog of the actions of the other political actors (McAllister 2008a: 121-22). This section describes the characteristics of the public prosecutors in Brazil, with a focus on how their structure, preferences, powers and instruments enable them to have an impact on environmental policies.

The *Ministério Público* (MP) has existed in Brazil since 1609 (Macedo Jr. 1999), however its role and institutional organization has changed over time as different Constitutions have redefined its structure. As in most countries, one of its purposes is to prosecute, in the name of the State, those who commit crimes. However, in Brazil the MP has taken on an additional role that has led it to turn much of its attention to the process of public policy making. These changes began in 1985 when a legal instrument known as the "public civil action" (*ação civil pública*) was created, through which the MP could take to court any person or entity for harm done to the environment, consumer rights, or the artistic, cultural, historical, tourist and landscape patrimony of the nation.<sup>1</sup> The 1988 Constitution amplified the scope of the public civil action by stating that it is the institutional role of the *Ministério Público* to "promote civil investigations and public civil actions for the protection of public and social patrimony, of the environment and of other diffuse and collective interests."<sup>2</sup> This apparently innocuous article has enabled the MP to take into its jurisdiction the monitoring of all public policy, for practically any act of public policy making can be construed to affect "diffuse and collective interests."<sup>3</sup> The effect was to bring to the judicial arena a series of social conflicts that previously would have been mediated only in the political arena (Arantes 1999: 83; McAlister 2008a: 172-76).

Simply establishing a new role for the public prosecutors in the Constitution would be innocuous were it not accompanied by other provisions that granted them the conditions necessary to carry out that role. The Constitution did in fact provide those conditions, in terms of independence, resources and legal instruments. Whereas before the Constitution the MP was part of the Executive power, the new charter made the MP autonomous, not only in terms of insulation from interference by the other powers but also in term of budgets, which are fixed and automatic (McAllister 2005, 2008a). The Executive's only prerogative is to choose the head of the federal MP from one of its members at the start of the term, being immovable thereafter. This independence extends to the level of the individual prosecutors. The entrance into the career is by public exam open to all citizens with the necessary qualifications, though exams are difficult and vacancies often remain unfilled. The 1988 Constitution establishes that prosecutors cannot be fired, transferred nor have their salaries reduced. In addition each prosecutor is independent within the profession, being immune from internal pressure as in effect there is only administrative and not functional hierarchy (Arantes 1999:90). Salaries are among the highest in the country for public sector jobs and as a consequence they attract highly competent people (McAllister 2008a: 76-78).

In addition to resources, the MP possesses a set of powerful legal and judicial instruments. The first of these is the "conduct adjustment agreement," through which they can request that an individual, firm or governmental entity cease or change a certain behavior or be prosecuted (McAllister 2008a: 91-92). In practice this instrument has been a credible threat as it can impose significant costs even if the case is struck down in court. The MP also has the authority to open a "civil investigation," under which prosecutors can request free expert

<sup>1</sup> Public civil actions can be initiated by states, municipalities, public companies and even civil society. However in practice it is mostly the MP that takes the initiative. Other entities have preferred to invoke the MP rather than do so themselves. See McAllister 2008a: 152-53 (explaining that environmental groups bring their complaints to the MP and stating that about 97% of environmental public civil actions have been filed by prosecutors).

<sup>2</sup> 1988 Constitution art. 129-III.

<sup>3</sup> On the meaning of the terms diffuse and collective interests, see McAllister 2008a: 199-200 (n.5).

advice from police and other governmental organizations such as environmental agencies (McAllister 2008a: 90-91). And most importantly, they can file a civil public action to take to court those who harm collective and diffuse interests. In practice this has proven a tremendously effective instrument as the prosecutors are highly trained and know how to use the often tortuous Brazilian judicial system. Even though judges have the final word and may rule against the MP, many of those being prosecuted find it better to negotiate. It is estimated that about 90% of such suits are settled (McAllister 2008a: 99-100; Sadek 2000: 28)

Generous endowments of human and financial resources as well as an effective set of instruments are not enough to explain the new role taken by the MP. There remains the issue of motivation, that is, what this largely independent organization chooses to do with these endowments. With the Constitution of 1988, the MP was no longer charged with being the Executive's advocate, that is, defending the Executive's interest before the judiciary. This role was ascribed to a new governmental entity (the Union's General Advocacy) leaving the MP unencumbered to be the advocate of society, defending "diffuse and collective interests," prominently among which is environmental policy. Interestingly what evolved was a very particular pattern of preferences and motivations in the (mostly young) prosecutors, where they see themselves as playing a messianic role in society: defending the weak and defenseless (Arantes 2002). Importantly for the theme of this paper, they see a large part of their role as defending society from government, who they see as being responsible, by omission and by commission, of many violations against diffuse and collective interests. For example, rather than simply prosecuting a polluter, they will prosecute the environmental agency for allowing the pollution to occur (McAllister 2008a: 123-27).

The reasons for this zealotry are difficult to ascertain. It may be due to a self-selection process where individuals with that view of the world are more attracted to a job where they can "make a difference", or it may be induced by an *esprit de corps* that induces most members to adopt a common vision (McAllister 2008: 81-83). A survey by Arantes (1999) with 763 members of the *Ministério Público* shows that they see the social and political performance of the Executive and Legislature, at all levels and political parties as very poor. In addition they see themselves as the most important institution to defend, broaden and consolidate social rights.

A couple examples illustrate the pervasive influence of prosecutors in environmental policy and their *modus operandi*. This author first became aware the importance of the MP when participating as a consultant in a World Bank mission in 2001 that travelled to various parts of the country to study the role of property rights on the use of natural resources such as land, forests and water. The itinerary included visits to and interviews with a wide array of organizations and actors that competed for these resources or in some way affected how they were used. The list was meant to be comprehensive, including large and small farmers, squatters, loggers, landless peasants, politicians, mayors, governor's office, state and municipal environmental agencies or secretariats, land reform agencies, water basin committees, judges, police, academic specialists, NGOs, and community groups, among others. No consideration was given to public prosecutors as these had not seemed at the planning of the mission to have any link to the issue being studied. However, as one visit succeeded the next it soon became apparent that this was a serious omission. In interview after interview the narrative would include and frequently center on the role of public prosecutors. These surfaced not only in their more traditional capacity -- monitoring, enforcing and taking to court those that break the law -- but also in a surprisingly diverse set of other roles, such as coordinating collective action, brokering negotiations, acting as notary public for promises by other actors to do or refrain from doing given actions, and educating and providing information.

More recently, perhaps nowhere more than in the permitting processes of new hydroelectric dams has the role of public prosecutors been evident. Over 85% of the country's electricity is hydroelectric, and new dams are crucial to avoid an electricity shortage as was experienced in 2001. Accordingly President Lula's second term flagship program known as PAC (Program for Growth Acceleration) has more than half of its intended investment of R\$503.9 billion dedicated to energy related projects. The administration of this program was entrusted to Dilma Rouseff, the President's all-powerful cabinet chief and candidate for the 2010 presidential election. Despite all the political will dedicated to the PAC, it became clear from the outset that the large list of projects would not be easy to implement. Half way through the President's term more than 60% of the projects are greatly behind schedule (Estado de São Paulo, 02/01/2009).

One of the greatest obstacles has been the requirement of environmental permitting, given that infrastructure projects such as dams, ports and roads typically have large impacts on the environment. World Bank (2008) analyzes the problems involved in environmental permitting for hydroelectric projects in Brazil and finds that the costs imposed range from 15% to 19% of the cost of each installed megawatt, including the direct and the opportunity costs. The main problem is not only the length of time it takes to get all three required permits – 6.5 years on average – but more so the high dispersion of time among all cases, which raises the uncertainty and makes it harder to plan and finance the projects. One of the main sources of this state of affairs, according to the report, is the unpredictability that derives from the involvement of the public prosecutors:

Public prosecutors enjoy virtually unlimited autonomy in Brazil. This power has no parallel in any of the other countries examined in this study and plays an important role in the lack of predictability and timeliness of the environmental licensing process. This allows prosecutors to be involved in technical or administrative acts related to the environment, which would otherwise fall under the mandate of the environmental agency. (World Bank 2008: 10)

This impact of the public prosecutors comes not only from instances when they directly challenge a proposed or initiated project, but also by prosecuting the members of the state and federal environmental agencies in charge of reviewing and deciding on the requested permits. According to the World Bank report the propensity of the prosecutors to charge them under the Law of Environmental Crimes for administrative improbity has led the staff of the licensing organizations to become highly conservative with the concession of licenses, thus adding to the delay and to the uncertainty (World Bank 2008).<sup>4</sup> In 2008, for example, the federal MP warned the president and directors of IBAMA (the federal EPA) that it would take them to court using that law if they insisted in conceding the license for the construction of a dam in the Madeira river in the Amazon (Valor Econômico, 10/28/2008). In the same month President Lula complained in a speech that today in Brazil a civil servant "counts a thousand times to ten" before signing any authorization due to fear of the MP's reaction (O Estado de São Paulo, 10/22/2008).

### **3. Political Institutions and Environmental Policy in Brazil**

The involvement of public prosecutors in environmental policy occurs within a setting of widespread mismanagement of the environment in Brazil that has often resulted in economically inefficient, socially inequitable and environmentally devastating outcomes. Pollution and deforestation rates have been high and are following an increasing trend, notwithstanding the deceptive respite of occasional yearly declines. Property rights to natural resources are ill-defined and insecure, leading to both lack of investment and premature investment (Alston, Libecap and Mueller 1999). The scramble to appropriate these resources involves massive invasion of public and private property. Laws and regulations are unremittingly and blatantly disrespected. Forest reserve requirements (80% in the Amazon)

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<sup>4</sup> On the Law of Environmental Crimes and the criminal enforcement power of prosecutors see McAllister 2008a: 26, 93-94.

are rarely observed and even conservation units and indigenous reserves are systematically plundered (McAllister 2008c: 10876-77). Economic activity in the form of agriculture, ranching, mining, fishing and extraction is often wasteful, destructive and unsustainable, resulting in pollution, erosion, extinction, conflict and violence. Programs, policies and regulation that purport to address these issues are frequently innocuous and many times provide incentives that either exacerbate the problem or lead to other unexpected perverse outcomes. This often occurs due to lack of resources, but in many cases due to incompetence and in others due to malfeasance and corruption.

It is not the absence of interest on the part of the government or society that has allowed this alarming state of affairs to arise and to persist. The environment features prominently in governmental policy and discourse. These in turn reflect the interests of the electorate that demands attention to these issues, which have consequently been hoisted to cabinet level with the creation of a Ministry of the Environment (1992) and a Ministry of Agrarian Development (2000). In addition both areas count with large executing agencies; IBAMA (Brazilian Institute for the Environment) and INCRA (National Institute for Land Reform) as well as a host of other secretariats and departments at different levels of government. All of these organizations are active in their fields and constantly pursue new programs, policies and actions. In addition, they are constantly seeking to improve and are open to new technologies and training of their staff.<sup>5</sup>

Neither is it the case that the problems identified above can be attributed to a lack of legislation. It is generally agreed that Brazilian law contains a body of legislation specific to the issues of land and the environment that provides a good legal basis and the instruments needed to actually address those problems (Cavalcanti 2004; McAllister 2008a). This legislation includes several direct references to these issues in the Constitution (1988), the Land Statute (1964), the Law of Environmental Crimes (1998), the Forest Code (1965), as well as a host of related complementary laws and regulations that have improved and updated these legal documents. In addition, based on past experience and the political support for these kinds of issues, it is probably the case that new legislation will be forthcoming as it is needed.

The current state of the environment described above is also not due to lack of interest from society or to lack of organization or opportunity to voice its opinion and to participate in the formulation of policy. Although the Brazilian population is more than 81% urban and less than 11% live in the Amazon region, environmental issues in general and those related to the Amazon in specific feature prominently in the collective conscious. There is a large, diverse and vibrant third sector composed of civil society organizations and social movements which participate in numerous fora at all levels of government (Hall 1997; Hochstetler and Keck 2007). There is a long tradition in Brazil of the participation of councils in policymaking, such as the CONAMA (National Council for the Environment) and a host of local councils which deal with issues from environment to education to the regulation of water basins. These councils provide access for groups, such as NGOs, to truly have a say over policy (Ascerlad 1996; Banco Interamericano de Desenvolvimento/Ministério do Meio Ambiente 2002.). The environment is the issue which has generated the largest number of NGOs in Brazil (IBGE 2008). In addition the press is independent and vocal on issues related to the environment.

An apparent puzzle emerges from the picture presented above. How can the sorry state of environmental resource use described in the first paragraph of this section have emerged and persisted in the rosy social, political and legal environment described in the following three? The characteristics of environmental resources may be partly accountable for the poor outcomes, as they tend to be large, distant, obscure, inhospitable, amorphous,

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<sup>5</sup> For example, it is now possible to sign-up online to receive free email reports on newly detected cases of deforestation from INPE (National Institute for Space Research).

ever-changing, etc, which creates impediments for the timely collection of information and implementation and enforcement of policies. Nevertheless, the magnitude of social and economic waste is so large that there should be great incentives for reform so as to capture currently dissipated rents. The standard answer to this puzzle is that it is in fact no puzzle at all. Government discourse is merely lip-service and is not matched by effective action. Ministries may have been created but they are under-funded and are not given real power. Programs and policies are just for show. Just enough is done to convince the electorate, the press and the international community that the intention is there and that change is under way, but not enough is done to actually achieve that change. Similarly the legislation may be well-meaning and legally sound, but it is useless as it is rarely applied and does not reach the places where it is most needed. As for civil society, NGOs and social movements, they are given a voice but that voice is rarely heard. The participation in policy making through councils and other forums merely serves to appease these groups and diffuse their criticism.

This assessment of the true nature of environmental policymaking in Brazil may be correct in many points, but it is too vague to be meaningful or useful. What is needed is an understanding of why this is the way things take place, that is, an understanding of the determinant of the choices that have led to this state of affairs. It is not enough, for example, to state that pollution and deforestation continue to grow because environmental regulators are not allocated enough resources.<sup>6</sup> The reason that those resources are not available is a direct consequence of political decisions made within the policymaking process. The next section describes the relevant dynamics of the policymaking process and shows how public prosecutors affect these dynamics.

#### **4. Brazilian Political Institutions and Policymaking Process**

The main characteristic of the general policymaking process is the dominance of a fiscal imperative that leads the President to use his/her substantial powers to pursue monetary stability and fiscal responsibility.<sup>7</sup> The fiscal imperative means that all other policy areas will only be attended to if the macroeconomic constraint permits. The environment is the quintessential residual policy area, where the first cuts will be sought when the fiscal constraint becomes binding, as it has been at varying levels in the past decades. However, there are countervailing constraints that impede the President from simply pushing environmental policy to the sidelines.

##### *4.1. Four Categories of Policies*

The most salient feature of Brazilian political institutions is the strength of the President. This strength is based on a series of instruments, rights and prerogatives that in essence allow the Executive to closely control the political agenda and to a great extent achieve his/her policy preferences. This does not mean that the Executive's powers are unchecked, as several other actors, such as Congress, the Judiciary and Public Prosecutors have constitutionally defined powers to constrain the President's actions in specific situations. Four categories of policy outcomes emerge from this interaction. The first consists of macroeconomic policies, such as fiscal and monetary policies, with a direct impact on stabilization and economic growth. These goals are given priority above all other issues and are thus known as the 'fiscal imperative.' The President, independent of personal ideological preferences, has electoral incentives to pursue these policies in an orthodox manner as he/she is seen by voters as responsible for outcomes in this area and is accordingly rewarded or punished. Similarly, global financial markets are quick to punish any deviant behavior in this area affecting exchange rates, country risk and investment

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<sup>6</sup> A commonly heard diagnosis along these lines is that the Amazon covers over 5 million square kilometers and yet the federal environmental agency has less than 300 inspectors for the region.

<sup>7</sup> This section is based on Alston, Melo, Mueller and Pereira (2008).

flows.<sup>8</sup> Whereas the electoral connection and financial markets assure that the President will want to prioritize stable and adaptable macro policies, strong presidential powers assure that he/she has the ability to do so.

The second category involves policies used by the President to provide patronage to other political actors in exchange for support in approving his/her agenda of reforms, that is, geographically concentrated transfers, or “pork.” Political institutions in Brazil provide the President with several political ‘currencies’, such as jobs in the federal structure and budgetary transfers that can be used to ‘purchase’ support, especially within Congress, thus providing high levels of governability at low cost. Although there are undesirable aspects to this form of policymaking, there are also advantages of having effective means of realizing political transactions in a country with such dire need for reforms (Alston and Mueller 2006).

The third category includes policies that are hard-wired at some ‘constitutional moment’ and cannot be easily changed. These are policies such as social security, education and health that typically have strong externalities for society but whose beneficial effects only mature in the long term so that politicians might be tempted to trade them off for policies with more immediate political returns, which is what motivated insulating them in this way. Most of this insulation was done during the writing of the 1988 Constitution. Despite the President’s strong institutional powers the hardwiring is binding, forcing the government to finance these through extreme levels of taxation, high levels of borrowing and by holding off on non-hardwired expenditures, which are the final category of policies.

The final category consists of residual policies, which are only given priority when the objectives of the first category of policies (the fiscal imperative) have been secured. These are policies that, similarly to the previous category, can be postponed with relatively few short term costs to the government, but over which no agreement for hardwiring was achieved. They also include policies that the government can credibly yet deceptively claim to be pursuing without actually having to detract resources from the first category of policies. Policies related to the environment, infrastructure, poverty, land reform, etc. are in this category. Note that they are frequently policies that have a strong ideological component. As a result of these characteristics these policies have a tendency to be volatile, oscillating according to political shocks, such as when a new president comes to office.

Summarizing, in Brazil one will observe stable and adaptive macro policies that are achieved through the exchange of pork for support between the Executive and Congress, with some policies hardwired beyond the political actors’ reach, and the remaining set of policies dependant on budgetary conditions and fluctuating in content according to political and economic shocks. Having described the dependent variable, that is, the characteristics of policies in Brazil, the remainder of this section describes the political institutions and the policymaking game that produce these outcomes.

#### *4.2. The Pursuit of Stable Macroeconomic Policies and its Consequences*

The claim thus far has been that the President faces strong incentives to pursue stable and adjustable macro policies, and that he/she possesses strong powers with which to do so. Evidence of the first claim is the surprising adherence by the Lula government to orthodox fiscal and monetary policy when he and his party had always forcibly combated exactly this line of policy. Evidence of the second has been the high rate of presidential success in the past two decades. The purpose now is to provide more detail on how this state

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<sup>8</sup> Given the size, diversity and integration of the Brazilian market to the global economy, credibility and reputation are much more important than in most other Latin American countries where the cost of alarming foreign investors is smaller.

of affairs affects the policies that emerge and their characteristics.<sup>9</sup> Much of the pursuit of stable macro policies takes place through amendments to the constitution in areas such as administrative reform, social security reform, tax reform, etc, that have important implications for current and future macroeconomic variable. It is this pattern, where the President pursues fundamental reforms in a responsible manner that has dominated the agenda in Congress since the mid 1990s.

Simultaneous to the reform agenda, the day to day running of government policy is administered by the Executive similarly subject to the overriding goal of stable macroeconomic variables. This implies tight fiscal policies that are achieved through very careful attention to the level of internal debt and the high primary surplus targets. This has important consequence for all policy areas, including environmental policies, as resources allocated by the budget remain contingent on those targets being met. The Executive has great discretion whether or not to execute expenditures contained in the budget so as to assure the primary surplus and consequently the intended debt/GDP ratio. The main instrument used to suspend expenditures is known as *contingenciamento*, as they remain contingent on those targets being achieved. At the beginning of each fiscal year the government passes a decree impounding part of the discretionary expenditures in the budget, that is, those that are not hard-wired. As the year proceeds, these resources can be “unimpounded” if tax receipts are greater than expected and if hard-wired expenditures have not been greater than expected. These impoundments are used across the board affecting every governmental expenditure in every ministry, department, agency, secretariat, etc, in all three branches and all levels of government. However, some expenditures are more vulnerable than others, which results in the pattern of volatile residual policies described above. These are areas, such as environment, poverty reduction, land reform, and especially infrastructure, which will tend to have their resources squeezed first and foremost when the primary surplus targets have not yet been reached. Thus, since 1999 when Brazil started the current trend of high primary surpluses in response to a massive devaluation of the Real, these types of policies have suffered significantly.

Achieving the required primary surpluses involves denying resources and transfers to great number of groups in society as it involves cutting expenditures which were already approved in the budgetary process and to which those groups consequently feel entitled to. The surpluses achieved since 1999 have been reached at the expense of a series of programs and policies which have to bear the brunt of the sacrifice, given that hardwired expenditures cannot be used for this purpose and that macro policy is foremost in the President’s agenda. This explains why issues such as poverty alleviation and land reform, which have always been flagship issues of the Labor Party and had figured prominently in the presidential campaign of 2002, were great disappointments. It also explains why a series of areas have been largely neglected in this period, such as investment in roads, public administration and universities. Understanding that environmental policy has been one of the major areas where the adjustment to the fiscal imperative has taken place allows us to go further than simply claiming that the poor results in this issue area are due to lack of resources or political will and to understand the underlying determinants of this situation. Note also that an implication of this analysis is that, as the country’s macroeconomic situation improves, with increased GDP and lower interest rates, primary surplus targets will come down relaxing the fiscal imperative and expenditures in these residual policies may be increased, although they still remain volatile as they are subject to political shocks.

#### 4.3. Constraints on the Fiscal Imperative

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<sup>9</sup> The central role of the fiscal imperative in the government’s motivations is explored in greater detail in Alston, Melo, Pereira and Mueller (2008) together with more detailed evidence of its pervasiveness.

If the fiscal imperative were the only determinant of the nature of environmental policy, then it would probably be the case that very little would even get initiated, as happens with several issues areas which simply do not emerge in the political debate. However, the environment has two forces which constrain the government's ability to refrain from dedicating effort and resources in that area.

The first is a strong preference by the electorate for policies aimed at protecting the environment. Alston and Mueller (2008) show that environmental interests have considerable political weight for the President, which implies that the prioritization of the macroeconomic variables cannot be achieved by simply postponing or putting the environmental policies on hold. Instead, the President must set up an entire bureaucratic structure so as to appease the political demand for environmental policy. This includes; a ministry with a carefully appointed minister with authentic green credentials; an environmental protection agency, special secretariats, councils and departments; high visibility programs and initiatives for each specific area (pollution, water, deforestation, etc); all sorts of general and specific legislation; and a constant place in the government's discourse. This structure is not simply a veneer and even the President's intentions to actually follow through with the promises for the environment are not entirely cynical. At the time of creation there might even be the plan to actually follow through. However, actual funding of these policies remains contingent on the fiscal imperative. When the macroeconomic variables constrain, nothing gets done. When they are less constraining resources will flow and some form of environmental policy will materialize. However, if the constraint becomes binding again, the flow dries up and policies are put on hold. Given the cyclical nature of macroeconomic constraints in Brazil in the recent past, this has implied high volatility of policies.

While the electorate is aware that the government may not be doing enough for the environment, information asymmetries do not allow them to ascertain the extent of the shirking. The slow rate at which environmental policy yields results implies a high level of information asymmetry by the electorate on what the government is actually doing and how effective those policies really are. As a consequence there is an incentive for the President to set up the scaffolding of environmental policy but to withhold the necessary financing for the policies to be effective. This appeases, to an extent, the demand for environmental policies without detracting much from the more pressing need to maintain a favorable macroeconomic environment. Manifestations of this strategy are apparent wherever the impacts of environmental policies are evaluated. The annual report of the Ministry of the Environment for any given year is a good example. These reports detail a long list of worthy programs dealing with issues such as biodiversity, pollution, sustainable development, forest-fire prevention, environmental education, ecological zoning, protection of rivers, etc.<sup>10</sup> Each program has a catchy name, a well devised strategy, an implementing bureaucracy and the funds budgeted in the budget law. Nevertheless, the description of what was actually accomplished during the year is more often than not a litany of excuses (correctly) ascribing to budgetary cuts (*contingenciamentos*) the fact that little was effectively achieved.

The second constraint faced by the government when deciding on how much effort and resources to dedicate *de facto* to environmental policies are the public prosecutors. As shown in Section 1, public prosecutors take it to be one of their primary missions to defend 'diffuse and collective' interest, of which the environment is a primary area of focus. Prosecutors are well endowed with human and financial resources, and have at their disposal potent legal instruments. Furthermore, their main line of action is not so much to target those that degrade the environment directly, but rather to prosecute the governmental agencies which should be monitoring and imposing the law. Thus the prosecutors clash directly with the government's natural strategy to setup the makings of an environmental policy but to only follow through contingent on the fiscal imperative. In the next section I test whether

<sup>10</sup> For an example see [http://www.abrasil.gov.br/avalppa/site/content/av\\_prog/orgao/18/orgao18.htm](http://www.abrasil.gov.br/avalppa/site/content/av_prog/orgao/18/orgao18.htm) .

these actions of the prosecutors result is an equilibrium where a higher degree of effort by the government gets channeled to environmental policy than would otherwise be the case. There is a constant tension between the government's natural electoral incentive to shirk on those policies and the constant vigilance and pestering of the public prosecutors. This does not mean that the environmental policy that emerges is ideal or even effective. In fact, the way in which public prosecutor's operate is highly uncoordinated and piecemeal (McAllister 2008a: 115-19, 162-64) with the result that although they have a large impact on the specific cases they address, the overall effect gets diluted and has a smaller impact on environmental outcomes than would otherwise be the case

## 5. A Model of Environmental Regulation Enforcement

In order to model the impact of public prosecutors on environmental policy this section considers the interaction of a polluter, a regulator which enforces environmental laws and a third party which enforces the enforcement of the regulator. The term 'regulator' is used broadly to refer to any actor that takes actions to enforce environmental laws, such as an environmental protection agency, another governmental agency, the *Ministério Público*, an NGO or private enforcers. In a first step the model considers only the interaction of the polluter and the regulator to determine the optimal amount of effort by the regulator in enforcing environmental laws and consequently the equilibrium amount of pollution. The second step will be to consider the role of a third party which takes action to compel the regulator to be more effective in enforcing the laws. Comparative static results will show which characteristics make an actor more effective as a regulator and an enforcer of enforcement. These results can then be used to compare the characteristics of actual enforcers of environmental laws (environmental agency, public prosecutors or private enforcers) to determine which of these has the greater potential to affect environmental outcomes.

### 5.1. The Polluter's Problem

The polluter is an economic agent that produces a negative externality that is directly associated with costs and benefits in production or consumption. Because there is a direct link of the pollution with those costs and benefits, we can express the polluter's problem as a choice of the optimal amount of pollution,  $x$ :

$$\max_x B(x) - C^P(x) - f(x)\varphi(\pi) \quad (1)$$

where  $B(x)$  is the total benefit to the polluter from  $x$  units of pollution (which corresponds to benefits from production or consumption),  $C^P(x)$  is the private cost of polluting,  $f(x)$  the fine associated with  $x$  units of pollution and  $\varphi(\pi)$  is the perceived probability that the fine will be levied and actually have to be paid.<sup>11</sup> This probability is affected by  $\pi$ , which measures actions taken by the regulator to enforce the environmental laws.<sup>12</sup> The efforts of the regulator will initially be taken as exogenous but will subsequently be determined by the regulator's maximization below. The fine is such that  $f(x) = 0$  for  $x \leq P^L$  (where  $P^L$  is the maximum amount of pollution allowed by law) and  $f(x) > 0$  for  $x > P^L$ .

The first order condition for the optimal choice of pollution is:

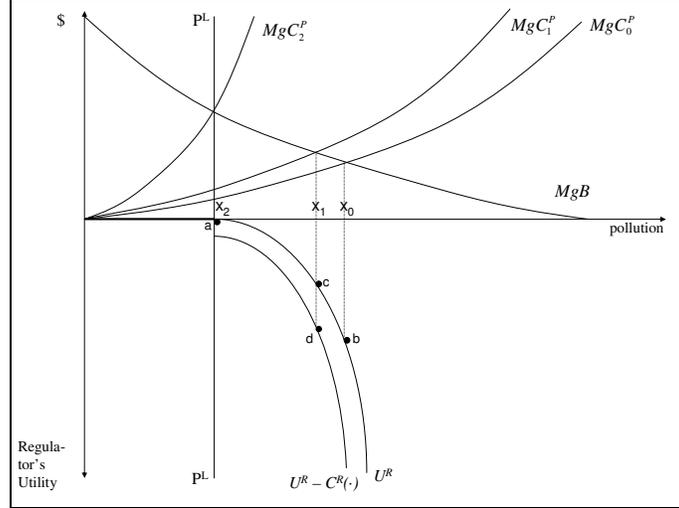
$$B_x = C_x^P + f_x\varphi(\pi) \quad (2)$$

This condition simply states that the optimal level of pollution for the polluter is that where the marginal benefit (LHS) equals the marginal cost (RHS), which is made up of the private marginal cost of polluting plus the expected fine.

<sup>11</sup> It is assumed that  $B_x > 0$ ,  $B_{xx} < 0$ ,  $C_x^P > 0$ ,  $C_{xx}^P > 0$ ,  $f_x > 0$ ,  $\varphi_\pi > 0$ ,  $\varphi_{\pi\pi} < 0$ .

<sup>12</sup> It is assumed that there is no strategic behavior by the polluter to affect the level of enforcement by the regulator. She simply observes the effort level of the regulator and chooses the optimal level of pollution taking the regulator's actions as given.

Figure 1 – Optimal pollution and regulator's utility.



The optimal choice of pollution is shown in the upper quadrant of Figure 1. If there were no regulation the polluter would choose the level of pollution at the point where  $MgBenefit = MgCost_0^P$ . In order to achieve compliance with the law, that allows a maximum of  $P^L$  units of pollution, the regulator would need to impose a fine schedule such that  $MgBenefit = MgCost_0^P + f_x \phi(\pi)$ . One such schedule is illustrated in Figure 1 by the difference  $MgCost_2^P - MgCost_0^P$ . When an optimal fine schedule is in place, the polluter will choose  $x_2$  units of pollution, which is the maximum amount allowed by law.

#### The Regulator's Problem

It is assumed that the regulator's objective is to actually enforce the law, so that his utility is maximized when  $x \leq P^L$ . For  $x > P^L$  the regulator's utility decreases with each additional unit of pollution, according to the following quadratic utility function,  $-\alpha(x(\pi) - P^L)^2$ . The effort  $\pi$ , placed by the regulator to enforce the law, is costly so  $C^R(x(\pi))$  must be subtracted from the initial utility.<sup>13</sup> The regulator's problem is thus:

$$\max_{\pi} -\alpha(x(\pi) - P^L)^2 - C^R(x(\pi))$$

subject to

$$x = \arg \max_y B(y) - C^P(y) - f(y)\phi(\pi) \quad (3)$$

This formulation states that the regulator will choose  $\pi$  so as to increase the probability that the pollution will be detected and punished, thus leading the polluter to optimally reduce  $x$  in accordance to her problem in (1). This effort by the regulator yields a benefit by reducing pollution, but is costly. The equilibrium condition for (3) to be maximized is:

$$-2\alpha(x(\pi) - P^L) = C_x^R \quad (4)$$

This condition comes from the fact that by choosing  $\pi$  the regulator is indirectly choosing  $x$ .<sup>14</sup> In equilibrium the marginal cost of increasing enforcement effort (RHS) must equal the marginal benefit (LHS). The regulator's problem can be seen in the lower quadrant of Figure 1. Utility is measured increasing vertically with a maximum point at 0. The  $U^R$  downward sloping curve for levels of pollution greater than  $x_1$  shows the decreasing utility to

<sup>13</sup> It is assumed that  $C_x^R < 0$ ,  $C_{xx}^R < 0$ ,  $x_{\pi} < 0$  for  $x > P^L$  and  $x_{\pi} = 0$  for  $x \leq P^L$ .

<sup>14</sup> Comparative statics on (2) show that  $\frac{\partial x}{\partial \pi} = \frac{\phi_{\pi} f_x}{B_{xx} - C_{xx} - \phi(\pi) f_{xx}} < 0$  for  $f_{xx} \geq 0$  or sufficiently small.

the regulator as pollution increases. With no regulation the polluter chooses  $x_0$  units of pollution and the regulator's utility is at  $b$ . With an optimal fine, such that the marginal cost of polluting becomes  $MgC_2^P$ , the polluter chooses to pollute at  $x_2$  and the regulator's utility is at  $a$ , its highest possible level. In order to understand the regulator's choice of  $\pi$  start at a situation where no regulation is being realized and consider a marginal increase in  $\pi$  such that pollution decreases from  $x_0$  to  $x_1$ . This brings the regulator's utility up along  $U^R$  from point  $b$  to point  $c$  (remember that it is the vertical distance that matters). However there is also a cost of increasing enforcement effort, which is represented by the downward shift of  $U^R$  to  $U^R - C^R(\cdot)$  that bring the regulator's utility down from  $c$  to  $d$ . The net effect of increasing enforcement so as to reduce pollution from  $x_0$  to  $x_1$  in Figure 1 is to move utility up from  $b$  to  $d$ . The regulator will continue to increase  $\pi$  marginally, and thus decrease  $x$ , until the net effect is zero and (4) holds, at which point the optimal amount of enforcement effort will have been reached.

The actual equilibrium reached will depend on the regulator's cost function. If the costs of regulation are very high, any attempt to increase  $\pi$  will yield more costs than benefits and the locus of utilities would be decreasing throughout the range from  $x_0$  to  $x_2$ . In this case the highest attainable utility would be with pollution at  $x_0$ , which would be achieved by simply placing no effort in enforcing the law. If the costs of regulating are very low, an upward sloping locus from  $x_0$  to  $x_2$  will result, yielding full compliance with the law. Finally, if the costs of regulating are moderate, at least for the initial units of effort, an interior solution such as  $x_1$  would result.

These results provide testable hypotheses as to which type of environmental 'regulator' will be most effective; an environmental regulatory agency, an NGO, private enforcers, public prosecutors, etc. By looking at the structure and process of each regulator - that is their design, governance and the institutions which constrain them - their cost of regulating can be inferred and conclusions reached about their potential effectiveness.

### 5.2. The Regulator's Problem with a Third Party Enforcing Enforcement

Assume now that there is a third party, such as a different governmental agency, an NGO, private enforcers or public prosecutors, that can impose a cost on the regulator for not bringing pollution down to levels specified in the law. These costs may be imposed by, for example, taking the regulator to court or exposing him in the press. This adds a term to the regulator's objective function that penalizes him for not enforcing the law;  $C^{RNE}(x(\pi), \gamma)$ , where  $\gamma$  is the level of effort of the third party in enforcing enforcement.<sup>15</sup> Initially this variable will be taken as given, but will subsequently be derived endogenously from the enforcement enforcer's problem below. The regulator's problem is now:

$$\max_{\pi} -\alpha(x(\pi) - P^L)^2 - C^{RE}(x(\pi)) - C^{RNE}(x(\pi), \gamma)$$

subject to

$$x = \arg \max_y B(y) - C^P(y) - f(y)\varphi(\pi) \quad (5)$$

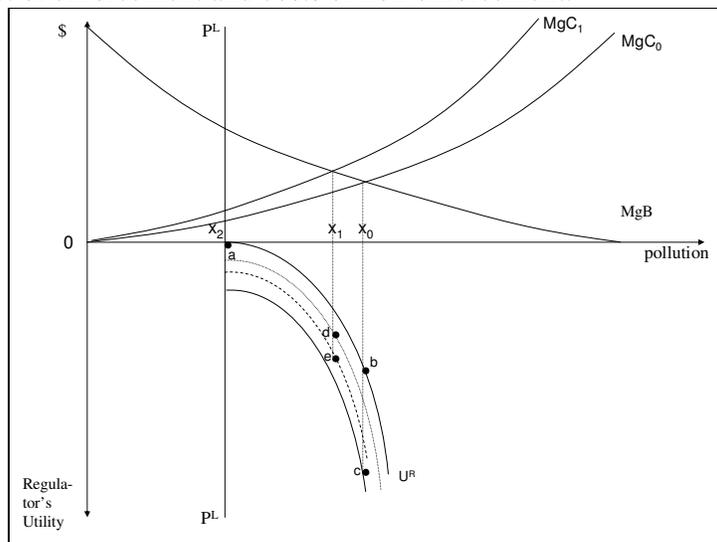
This yields the following first order condition:

$$-2\alpha(x(\pi) - P^L) - C_x^{RNE} = C_x^{RE} \quad (6)$$

This is similar to (4), except that there is now an additional term on the marginal benefit side. It is now the case that increasing regulatory effort not only brings pollution down, which benefits the regulator directly, but also reduces  $C^{RNE}$ , the cost imposed on the regulator for non-performance. In equilibrium both of these marginal benefits must equal the marginal cost of regulating,  $C_x^R$ .

<sup>15</sup>  $C^{RE}$  now denotes the cost to the regulator of enforcing the law and  $C^{RNE}$  the cost of not enforcing the law. It is assumed that  $C_x^{RNE} > 0$ ,  $C_{xx}^{RNE} > 0$ ,  $C_{\gamma}^{RNE} > 0$ .

Figure 2 – Cost of enforcement and costs of non-enforcement.



The regulator's choice process is shown in Figure 2. Without any effort at regulation the regulator has no  $C^{RE}$  and pollution is set at  $x_0$  by the polluter. But the regulator is penalized by the third party with a cost of  $C^{RNE}$ , which lowers his utility from  $b$  to  $c$ . If the regulator increases  $\pi$  marginally, pollution is reduced to  $x_1$ . This not only increases utility directly, but also reduces the cost of not enforcing bringing the regulator's utility up to point  $d$ . But the increase in  $\pi$  also entails a cost through  $C^{RE}$ , which brings utility down to  $e$ . As drawn in Figure 2 the net effect on the regulator's utility of the increase in  $\pi$  that reduced pollution from  $x_0$  to  $x_1$  was positive, as  $e$  is higher vertically than  $c$ . The regulator will thus consider increasing  $\pi$  further until the net effect is zero and the equilibrium level of pollution has been reached. As before the actual equilibrium will depend on the regulator's costs of enforcing and of not enforcing, the net effect of which will determine a solution.

The parameter  $\gamma$  measures the level of effort placed by a third party to enforce the enforcement activities of the regulator. Comparative static results show that an increase in  $\gamma$  leads to more effort by the regulator:  $\frac{\partial \pi}{\partial \gamma} = \frac{-C_{\gamma}^{RNE}}{x_{\pi}(2\alpha + C_{xx}^{RE} + C_{xx}^{RNE})} > 0$ . The final step of the analysis is thus to ask how the third party chooses how much effort to put towards pressuring the regulator, given the fact that its choice of  $\gamma$  leads to more effort by the regulator and hence less pollution.

### 5.3. The Enforcement Enforcer's Problem

Assume that the enforcement enforcer's utility is maximized when the law is respected and pollution is such that  $x = P^L$ .<sup>16</sup> His utility is  $-\beta(x(\pi(\gamma)) - P^L)^2$ , excluding the cost of effort, which is similar to that of the regulator except for the preference intensity parameter  $\beta$  which measures how sensitive his utility is to a change in pollution (the greater the parameter the higher the sensibility). The choice variable is  $\gamma$  which is the level of effort to enforce the enforcement of the regulator, which also creates a cost  $C^{EE}(x(\pi(\gamma)))$ . The enforcement enforcer's problem is thus:

$$\max_{\gamma} -\beta(x(\pi(\gamma)) - P^L)^2 - C^{EE}(x(\pi(\gamma)))$$

subject to

<sup>16</sup> Setting the enforcement enforcer's preferred pollution more or less stringent than the law does not change the analysis as what matters is the preference intensity parameter  $\beta$ .



In the next section it will be of interest to know what happens to this equilibrium when there is a change in two parameters. The first is the enforcement enforcer's preference intensity,  $\beta$ , which measures how much he cares about pollution levels. The second is a new parameter  $\omega$  now added to his cost function ( $C^{EE}(x(\pi(\gamma)), \omega)$ ), which measures personal or institutional characteristics of a given enforcement enforcer that provide greater or smaller ability pressure the regulator.<sup>18</sup> Comparative statics on (8) show that:

$$\frac{\partial \gamma}{\partial \beta} = \frac{2(x(\pi(\gamma)) - P^L)}{-x_\pi \pi_\gamma (2\beta + C_{xx}^{EE})} > 0 \quad \text{for } x > P^L \quad (9)$$

and

$$\frac{\partial \gamma}{\partial \omega} = \frac{C_{x\omega}^{EE}}{-x_\pi \pi_\gamma (2\beta + C_{xx}^{EE})} < 0 \quad (10)$$

Result (9) states that the greater the enforcement enforcer's preference for achieving low pollution the more effort that will be expended in pressuring the regulator. Result (10) shows that an enforcement enforcer that has better access to resources, staff and policy instruments (that is, lower  $\omega$ ), will expend more effort to compel the regulator to uphold the environmental law. This paper sustains that of all the potential enforcement enforcers in Brazil, public prosecutors have the characteristics to be the most effective.

## 6. Measuring the Impact of Public Prosecutors

The claim in this paper is that the existence of public prosecutors, endowed with the motivations and powers described in the previous sections profoundly affects the shape and impact of environmental policy in Brazil. This section presents statistical analysis that supports this claim.

Given their omnipresence there is a natural tendency to presume that the impact of public prosecutors in Brazil would be positive and sizeable. Because they are ubiquitous and are systematically restricting the behavior of other actors, be they polluters or negligent enforcers, it seems straightforward that a positive impact on the environment naturally follows. Yet there are several reasons why one cannot simply infer that public prosecutors are pivotal from their universal presence and high level of activity, thus the usefulness of a closer look at the data through an econometric exercise. Before describing the test I list three difficulties in trying to measure the impact of the prosecutors as caveats that must be kept in mind when interpreting the results.<sup>19</sup>

The first problem is related to the scale of their intervention relative to the size of the problem to be addressed. Even if public prosecutors are effective where they are present, it may be the case that the magnitude of environmental problems in Brazil are so large that the prosecutors, despite their efforts, are not able to significantly improve the overall situation, rather only to address selected issues here and there in a dispersed manner. Testing whether or not this is the case would require having a measure of the aggregate environmental situation and its evolution over time.

A second difficulty with ascertaining the true impact of the public prosecutors is that although they may be addressing several important issues effectively at the individual level, it may be that the lack of coordination across prosecutors, as well as with other organizations, undermines the overall impact, given the many interdependencies among

<sup>18</sup> A higher  $\omega$  represents greater impediments for the enforcement enforcer to influence the regulator, so  $C_{\omega}^{EE} > 0$  and  $C_{x\omega}^{EE} < 0$ . These costs can be related to budgetary issues, political control by other governmental actors, availability of policy instruments, staff capacity, etc.

<sup>19</sup> Similar weaknesses in the *Ministério Público's* ability to address environmental problems are also brought up by McAllister (2008a: 11-14).

environmental factors as well as the linkages among the required solutions (McAllister 2008a: 115).

A third problem of gauging the public prosecutors' true impact is the fact that all policy areas are interlinked through the budget, so that when the *Ministério Público* forces a governmental agency to address an issue that was not being given the proper attention, this solve that problem at the cost of some other policy issue over which the prosecutors have less concern, and will now be left uncovered. When this happens the prosecutors are essentially taking on the role of policymakers and there is no guarantee that the new mix of policies that will emerge is better in terms of social welfare than the previous status quo.<sup>20</sup>

As a first attempt at testing the impact of public prosecutors, I regress a measure of environmental quality at the state level against a measure of the strength of the prosecutors in that state, plus a series of controls.<sup>21</sup> This approach addresses the scale and coordination problems discussed above but not that of the general equilibrium of policies. The idea is to test whether, everything else constant, states with more active *Ministérios Públicos* have a higher perception of environmental quality. The dependent variable is an index of environmental quality constructed with data from IBGE (2005), which surveyed all Brazilian counties for the existence of environmental problems and the governmental structures in place to deal with those problems.<sup>22</sup> The index of environmental quality was constructed considering the perception of the presence of 19 different forms of environmental problems in each county averaged out to the state level. The environmental problems include contamination of the water supply, contamination of the soil, deforestation, air pollution, noise pollution, open air sewers, water scarcity, fish scarcity, erosion, among others. The index for each state was created from data for all the different counties (*municípios*) in the state. There are 5,555 counties in all and for each county there are 19 different pollutants or environmental problems. The index is thus created from 105,545 data points.<sup>23</sup> The key independent variable is an index of the strength of public prosecutors in each state. This variable is constructed using data from Sadek and Lima (2006) using principal component analysis on the following six variables: (i) *Ministério Público* expenditures per resident; (ii) MP expenditures as a share of total state expenditures; (iii) MP staff per 100,000 residents; (iv) percent of seats for prosecutors that are not vacant; (iv) number of prosecutors per 100,000 residents; (v) number of Civil Action Suits in 2004.<sup>24</sup> The result is an index that ranges from zero to one with a higher value denoting a stronger presence of the prosecutors in that state.

In order to address the omitted variable problem an index of the strength of environmental regulation was added as an independent variable. This index was created with the IBGE (2005) county data on the existence of governmental structure for dealing with

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<sup>20</sup> An additional difficulty with ascertaining the impact of public prosecutors is that many of their actions must ultimately go through the judiciary where they are frequently struck down. On the other hand, the mere existence of the public prosecutors poses a significant deterrent effect so that their overall impact is larger than the sum of cases in which they are involved.

<sup>21</sup> Ideally this exercise would be performed at county level, but this is not currently possible due to limitations on the availability of data on the public prosecutors. The main drawback is the small number of observations.

<sup>22</sup> The surveys were answered by the mayor's office in each county.

<sup>23</sup> The index for each state was created by dividing the total number of problems found in each county by the number of counties in the state, multiplied by 19 (the number of possible problems), that is, Index of Env. Quality =  $1/(\text{No. of env. problems} / (\text{No. of counties} * 19))$ . It can thus be thought of as the average probability of a county in the state having a given environmental problem. The 26 states varied from 2.30 to 24.67.

<sup>24</sup> Sadek and Lima (2006) was a government sponsored 'census' of the *Ministério Público*. The index is normalized to the 0 – 1 interval by the formula  $(x_i - \text{Min}(\mathbf{x})) / (\text{Max}(\mathbf{x}) - \text{Min}(\mathbf{x}))$ , where  $\mathbf{x}$  is the vector obtained from the principal component analysis.

environmental problems.<sup>25</sup> The idea is to control for the states' ability to address environmental issues through regular environmental regulation and see if the public prosecutors have an additional effect. The states' regulatory capability should be correlated with a series of other capabilities and characteristics thus attenuating the omitted variable problem. In addition controls are added for the GDP per capita, population density and level of education. These controls are highly correlated with several other state characteristics that could have an impact on environmental quality that are left out due to the small sample size and to avoid multicollinearity.<sup>26</sup> A squared term is added for GDP per capita to allow for a non-linear effect indicating an environmental Kuznets curve in which environmental quality first declines with economic development but after a certain point starts to increase with higher levels of income (Grossman and Krueger 1995).

The results are presented in Table 1 and descriptive statistics for all variables are presented in the appendix. Clearly there is the potential for a simultaneous causality between environmental quality and both public prosecutors and environmental regulation. It is possible that states that have lower environmental quality may be more (or less) willing to invest in regulation or in public prosecutors. If this is the case the use of ordinary least squares would yield inconsistent results. Therefore the regression is performed using both ordinary least squares (column 1) and instrumental variables estimation (column 2), which will allow a Hausman-Wu test to be performed to determine whether there actually is simultaneity.

Table 1 – Public Prosecutors and Environmental Quality.

Dep. Variable: Environment: Quality	(1) OLS	(2) IV
Public Prosecutors Index	0.265* (1.69)	0.682** (2.22)
Environmental Regulation index	0.446*** (3.00)	0.923*** (2.84)
GDP per capita	-3.191*** (-2.96)	-3.046*** (-2.70)
GDP per capita squared	1.504*** (4.11)	1.417*** (3.17)
Population density	-0.291*** (-4.36)	-0.335*** (-3.62)
Education	1.139*** (3.92)	1.329*** (3.61)
Constant	1.944 (1.59)	2.641* (1.98)
Method	OLS	Instrumental Variable
	Robust Std. Errors	Estimation
Observations	26	26
R-squared	0.645	0.311
Hausman-Wu test	F(2, 17) = 4,95	
H <sub>0</sub> : Pub. Prosecutors and Environ. Reg. are exogenous	p-value = 0.0203	

T-stats in parenthesis. \*\*\* = 1%, \*\* = 5% and \* = 10% level of statistical significance.

The dependent variable is an index that measures the level of environmental quality in a state based on survey data collected from 5,555 counties (IBGE, 2005), see footnotes 18 and 19. All variables in logs. Instruments for column (2) are: i – absolute value of latitude of state capital; ii – state's public revenue in 1928 (Fritscher, 2008); iii – number of counties in the state divided by the area (times 1000).

<sup>25</sup> This index was created with principal component analysis using the following variables: (i) number of counties that have specific environmental structures (EPA, secretariats, etc); (ii) civil servants dedicated to regulating the environment; (iii) number of counties that have environmental councils; (iv) number of counties that have environmental agreements (with state and federal governments and others); (v) states that have specific resources for environmental regulation; (vi) number of counties that have specific laws or ordinances for the environment. The index is normalized to the 0 – 1 interval by the formula  $(x_i - \text{Min}(x)) / (\text{Max}(x) - \text{Min}(x))$ , where  $x$  is the vector obtained from the principal component analysis.

<sup>26</sup> The sample size is 26 because the Federal District is left out. The fact that it is a one-county state makes it an outlier in the environmental quality index.

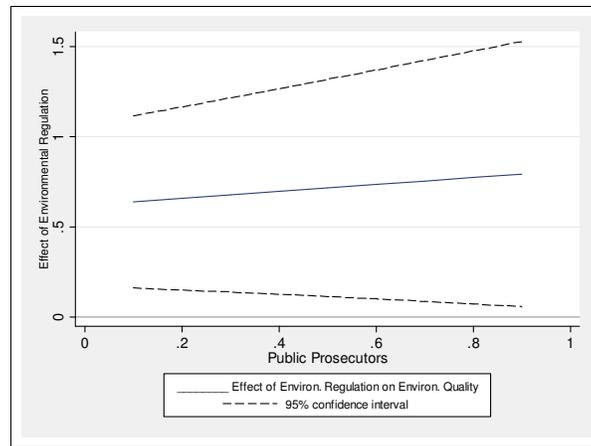
Three different instruments were used to control for the potential endogeneity of public prosecutors and of environmental regulation. To be valid these instruments must be correlated to the public prosecutor and environmental indexes, but must have no direct effect on the environmental quality variable. The first instrument is the distance of the state capital to the equator, following the literature on the impact of institutions and geography on economic growth (Acemoglu, Johnson and Robinson 2001; McArthur and Sachs 2001). The second instrument is the level of public revenues that each state collected in 1928 (Fritscher 2008). The idea is that there is a correlation between states' current bureaucratic capabilities and early governmental capabilities related to tax collection. Finally, the third instrument is a measure of the average size of the counties in a state, which may have an influence on the ease of addressing environmental issues for prosecutors and regulators.

Because the Hausman-Wu test indicates that we can reject the exogeneity of the public prosecutors index and the environmental regulation index I will focus the comments of the results on column 2 in Table 1. Starting with the controls we see that all three variables are statistically significant and have the expected sign. Whereas education is positively related to environmental quality, population density has the opposite effect. GDP per capita has an inverted U relationship with environmental quality, which would seem to indicate the existence of an environmental Kuznets curve. However, upon closer examination it turns out that the minimum of the curve is below the smallest observation in the sample so that in fact all states are on the upward sloping section of the curve. This means that as states become richer they tend to pollute more. It does not mean that eventually an environmental Kuznets curve dynamic will not take place in Brazil, with increased incomes leading to a higher demand for environmental quality. However, the data indicate that such a point has not yet been reached.

The key result in Table 1 is the positive and statistically significant coefficient for public prosecutors, which indicates that states with stronger and better organized public prosecutors will tend to have, *ceteris paribus*, higher levels of environmental quality. A one standard deviation increase in the public prosecutor index leads to an 18% increase in the environmental quality measure. This effect holds even controlling for the strength of environmental regulation, which is also positive and statistically significant. The magnitudes of the coefficients indicate a larger impact of regulation than of public prosecutors, however a test for the equality of both coefficients accepts that they are statistically equal (p-value of 0.434).

Another possibility is that there is an interaction between public prosecutors and environmental quality in which the public prosecutors catalyze the environmental regulation making it more effective on environmental quality. Such an interaction is consistent with the general *modus operandi* of public prosecutors in the literature (McAllister 2008c). In order to test this we included a multiplicative interaction term in the same specification in Table 1. The results of the interaction are presented in Figure 4. The full line shows how the impact of environmental regulation changes as the public prosecutor index increases from 0 to 1. The dashed lines show the 95% confidence interval. Because the interval does not contain the value 0 in all its range from 0 to 1, the impact of environmental regulation is statistically different from zero. At the lowest level of the public prosecutor index the impact of regulation on environmental quality is approximately 0.61. As the public prosecutor index increases, the impact of environmental regulation rises and reaches 0.81 when the public prosecutor index is 1. This is evidence that public prosecutors, besides their own direct effect on environmental regulation, contribute to make environmental regulation more effective.

Figure 4 – Interaction between Public Prosecutors and Environmental Regulation.



## 7. Conclusion

Environmental policy involves imposing restrictions on economic actors. This typically creates upfront costs, while the benefits often materialize only in the distant future. In addition, more often than not there are trade-offs between the environment and economic growth. This implies that the politically optimal environmental policy is generally much different than the socially optimal. Politicians, however, are not unconstrained in their choices and several forces may push for policies closer to the socially optimal. One of the most important is the preference of the electorate, which, even in developing countries, has increasingly demanded better environmental quality. However, information asymmetries and problems of collective action often blunt the effectiveness of pressure from the electorate so that other checks and safeguards are usually also essential. Effective legislation and strong environmental standards are necessary, but may be innocuous without the supporting institutions that assure implementation and compliance. Putting in place such institutions is, however, not a trivial matter, especially in developing countries where institutions in general and checks and balances in particular are typically more frail. A better understanding of institutions that support effective environmental policy is a major goal of the literature.

In this paper I have shown that public prosecutors in Brazil play a key role in environmental policy. They are endowed with institutional powers and strong motivations to defend diffuse and collective interest such as those related to the environment. In practice this mandate has been exercised primarily by acting as a check against omission and incompetence of governments and public bureaucracies. This has been a fundamental factor in shaping current *de facto* environmental policy as I have shown that in Brazil there are strong incentives for the government to only truly dedicate resources to this area when fiscal targets have been assured. The country has good environmental legislation and strong voter preferences for environmental quality, with several important programs in place in every environmentally sensitive area. However, the fiscal imperative has meant that this structure is often left inert. I have argued that the main force against this natural tendency has been the zealous vigilance of the public prosecutors. I provide statistical evidence that public prosecutors do in fact have a positive impact on environmental quality, even after controlling for other intervening factors such as income, education and regular environmental regulation. Importantly, the results show that the public prosecutors' effect is both direct, restricting the action of those who use the environment, and indirect, by making the regulatory agencies more effective. These results should only be seen as a first step towards understanding the role played by public prosecutors in Brazil and the potential for similar arrangements in other countries. Although these results show that public prosecutors have a beneficial impact on the environment, more empirical research is still warranted to quantify the magnitude of

that impact relative to the size of the environmental problems. This may become possible once systematic data on the public prosecutors' actions becomes available and would also benefit from the development of better measures of environmental quality.

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