Inter-American Development Bank
Banco Interamericano de Desarrollo (BID)
Research department
Departamento de investigación
Working Paper #423

Empirical Determinants of Good Institutions: Do We Know Anything?

Stéphane Straub

Université de Toulouse

June 2000

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Straub, Stéphane.
Empirical determinants of good institutions : do we know anything? / Stéphane Straub.

p. cm. (Research Dept. Working papers series ; 423)
Includes bibliographical references.

1. Public institutions--Evaluation. 2. Institution building--Econometric models.
3. Multiple comparisons (Statistics). I. Inter-American Development Bank.
Research Dept. II. Title. III. Series.

351.85 S86--dc21

Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, D.C. 20577

The Research Department (RES) publishes the *Latin American Economic Policies Newsletter*, as well as working papers and books, on diverse economic issues. To obtain a complete list of RES publications, and read or download them please visit our web site at: http://www.iadb.org/res/32.htm

Abstract*

Abundant empirical evidence links well-functioning institutions and good governance to better economic and social outcomes. It is thus an important challenge to determine which conjunction of factors produces better institutions. Along this line, the objective of this paper is twofold. First, it examines the existing results of the literature on this matter in a critical way, tries to assess their robustness, and explores alternative methodology. Second, it makes use of a more comprehensive database, including all the aspects previously analyzed in a separate manner, to derive systematic empirical results. After discussing the traditional robustness checks employed, for example, in the empirical growth literature, which appear to be of limited usefulness, we introduce factor analysis as a preliminary step toward model specification and subsequently perform multiple regression analysis. Of the four levels of explanation that we identify, namely control and historical variables, the nature of the political game, the size and nature of existing rents to be allocated, and the nature and quality of bureaucratic incentives, the later appears to be the more clearly linked to institutional quality. However, the results prove not robust when dealing with endogeneity problems. Various kinds of interactions and non-linear effects are also investigated, yielding no clear insights. We conclude regarding the fragility of existing data, in particular with respect to the incentive structure, and the need for a better theoretical understanding of the underlying mechanisms.

* I am grateful to my advisor Jean-Jacques Laffont for his guidance, as well as Jean Pierre Florens for helpful suggestions. I thank Yves Aragon, Alejandro Gaviria, Eduardo Lora and Franck Portier for their comments, as well as Daniel Kaufmann, Aart Kraay and Pablo Zoido-Lobatón of the World Bank, who made their data on institutional quality available, and Mark Payne at the Inter-American Development Bank, who provided part of the other data used. Part of this work was done while at the Inter-American Development Bank in Washington and special thanks are due to Ricardo Hausmann and Norelis Betancourt for making this stay possible, to Eduardo Lora for continuous encouragement, and to all the staff of the Research Department for their support.

" If you torture the data long enough, Nature will confess." (R. Coase)

I. Introduction

At the end of the 1980s, the so-called "Washington consensus" regarded macroeconomic stabilization, trade liberalization, deregulation and privatization as the cornerstones of any successful development strategy. Although these policies have in some cases proved useful in promoting higher levels of economic growth,[1] too often their application and effectiveness has been jeopardized by adverse circumstances generally referred to as "inadequate institutional conditions." Consequently, development analysis has moved beyond this set of policy recommendations and tried to integrate institutions into the development equation. Although the importance of institutions is by no means a new subject in economic theory, empirical contributions have been lagging. Fuelled by the appearance of an ever-increasing set of cross-country subjective indicators on institutional dimensions, empirical institutional economics has experienced an accelerated growth during the last decade and helped scrutinize and clarify the relationship between institutional quality and economic variables.

This empirical literature on institutions can be divided into two broad sub-categories. The first is mainly concerned with the way the quality of institutions affects economic and social outcomes. The second category corresponds to studies aimed at explaining why the quality of institutions varies across countries in the first place and what kind of factors can be found responsible for such a disparity. Given that better institutions are quite robustly linked to better development outcomes, this second line of inquiry becomes extremely interesting from a policy point of view. However, perhaps because it also raises more delicate empirical issues, it is less developed than the first category of studies.

We are primarily concerned with the second line of research, on the determinants of institutional quality. Specifically, the objective of this paper is twofold. First, it examines the existing results of the literature on this matter in a critical way, tries to assess their robustness, and explores alternative methodology.

[1] Not so, however, when considering poverty and inequality (see World Bank, 1998, and Stiglitz, 1999, for discussion).

Second, it makes use of a comprehensive database, including all the aspects previously analyzed in a separate manner, to derive new empirical results in a systematic way. To do so, the structure of the paper is as follows. Section II presents the existing empirical literature, focusing at length on the second category of papers mentioned above. Special attention is given to the different type of variables used in the existing literature and their relation to different aspects of economic theory. Section III presents the database, which includes a unique data set of six different aspects of institutional performance across a range of between 155 and 173 countries, constructed by Daniel Kaufmann, Aart Kraay and Pablo Zoido-Lobatón at the World Bank; the database is completed by a choice of 15 variables corresponding to the four groups discussed in Section II, namely political, rent, incentive, and control variables. Section IV discusses the robustness of the results reviewed. Aside from basic problems such as the quality of data and the potential endogeneity of independent variables, which are even more complicated when dealing with subjective data, the central question appears to be the determination of the right model specification. The analogy with empirical growth literature is straightforward, and indeed the robustness checks usually employed in this literature, as extreme bound analysis, have also been applied to institutional data. They are discussed here. Based on this discussion, Section V proposes an alternative approach based on multivariate data analysis. Section VI presents the results from this statistical approach, performs additional regression analysis based on them, and discusses the results. Section VII concludes.

II. Empirical Evidence on Institutions: a Review

Before going on, it is convenient to define the rather ubiquitous concept of institution. Following North (1994), we consider institutions to be "the incentive structure of society," i.e., the set of formal (rules, laws, constitutions) and informal (norms of behavior, conventions, self-imposed codes of conduct) constraints and their enforcement mechanisms, governing and shaping the behavior of individuals and organizations in society. Obviously, this concept of institutions encompasses a variety of dimensions.[2] Accordingly, private companies, non-profit and international organizations have used surveys of certain categories of agents to try to capture some

[2] See Payne and Losada (1999) for a useful discussion and illustration of the definition of institutions.

of these dimensions of institutions. The most common indicators refer to rule of law, corruption, risk of contract repudiation and quality of bureaucracy, among others. Their use is generally justified by a revealed preference argument in the sense that they have the advantage in capturing the perceptions of agents, which are the relevant decision variables. A further argument in their favor is that they measure both the intrinsic quality of norms and rules and the efficiency of their enforcement.[3] As might be expected, these indicators are generally correlated, showing that in a sample of countries, institutional performance tends to be relatively identically distributed across different dimensions.

In empirical works, the issue that has by far received the most attention is how the quality of institutions affects economic outcomes. To cite only a few studies based on the use of cross-country indicators, better institutions have been shown to promote growth (Mauro, 1995; Knack and Keefer, 1995; Kaufmann *et al*., 1999b), to be conducive to more developed financial markets (La Porta *et al*., 1998), to higher productivity (Hall and Jones, 1999), to more domestic and foreign investment (Mauro, 1995; Wei, 1997) and to better outcomes in terms of education, health, poverty, inequality, and income distribution (Kaufmann *et al*., 1999b; Chong and Calderón, 1999a and 1999b; Rodrik, 1999). The effect of institutional characteristics on the size and composition of public expenditures has also been documented, the most robust result being that corruption reduces spending on education (Mauro, 1998). Another strand of studies has looked more specifically at how different types of political institutions shape economic outcomes. Persson and Tabellini (1998) relate two fundamental features of the political system, majoritarian or proportional electoral rule, and presidential or parliamentary regime, to the size and composition of public expenditures. Henisz (1998) shows that an index of political constraints on the executive branch of the government, constructed to capture the feasibility of policy changes, is a significant predictor of cross-national variation in economic growth. In a long-run perspective, the classic reference on the historical relation between institutional evolution and economic performance is North (1990), who emphasizes the importance of institutions ensuring property rights to promote development. De Long and Shleifer (1993) document how, during the eight hundred years before the

[3] Of course, this might also constitute a drawback insofar as it makes it difficult to disentangle these two crucial aspects of what is an institution.

Industrial Revolution, small governments were able to foster fast growth (proxied by the size of cities).

There is thus relatively strong evidence linking well-functioning institutions and good governance to positive economic and social outcomes. Furthermore, these factors appear to be more important than factor endowments or any other explanation in determining cross-country differences in the overall level of development (Olson, 1996). The Inter-American Development Bank (2000) performs econometric estimations of the impact of three broad groups of factors, namely demography, geography and institutions, on the difference in the level of development of countries and regions over the world. To mention only some of the study's striking results, it shows that about 87% of the variance in world economies' per capita income can be attributed to these three structural variables, with institutions accounting for, by far, the greatest part. So it becomes crucial to determine if some systematic conjunction of factors can be proved conducive to better institutions. Less organized evidence, however, is available on this point. As we discuss in the next section, many different variables have been tried in cross-country regressions aimed at explaining institutional efficiency. We categorize these variables in four main groups: historical or control variables, political incentive variables, rent variables and bureaucratic incentive variables. These groups of variables obviously overlap to some extent.

A first group examines the historical factors of government performances. La Porta *et al*. (1998) measure government performance using proxies for interventionism, public sector efficiency, quality of public good provision, government size and political freedom. They relate these measures to religious, legal and ethnolinguistic characteristics, showing that the countries most likely to exhibit good institutions are those with ethnolinguistic homogeneity, common law tradition rather than French civil law or socialist law tradition, and Protestant rather than Catholic or Muslim religious dominance. Panizza (1999) further indicates that colonial history may be an even better determinant than legal tradition. La Porta *et al*. and Treisman (1998) discuss the mechanisms through which these historical determinants relate to the quality of institutions, considering cultural and political theories and relating their characteristics to the context and historical circumstances in which legal codes were first enacted.

To attain practical economic policy implications, this discussion should aim to elucidate what contemporary features of the broad incentive structure facing

economic agents were brought about by alternative historical conditions. In doing so, it should ultimately be possible to account, for example, for the influence of legal codes or of colonial history on the quality of institutions, with variables related to the contemporary bureaucratic and political incentive structure. It must be recognized, however, that due to the complexity and diversity of the historical evolution in different countries and to the limitations of existing data, we are probably a long way from this and historical variable are to be considered as basic control variables. Alternatively, these studies are useful in signaling potential instrumental variables for different institutional measures.

A second group of studies has focused on the characteristics of the political system, in particular variables referring to political structure and rules.[4] Treisman (1998) finds corruption to be significantly higher in federal states and in countries with less established democratic traditions. While the democracy effect may appear standard, since it corresponds to greater accountability, the federal structure effect is not straightforward and is related by Treisman to a greater division of power between different levels of government, leading to some kind of "bribe over-extraction" (Shleifer and Vishny, 1995).[5] Inter-American Bank (2000) also finds (weak) support for a higher level of institutional quality in parliamentary regimes and countries with proportional elections. The evidence points to better institutions being likely to arise in systems with stronger checks and balance between the executive, legislative and judicial powers, and whenever politicians find themselves in a position where they have to strike a balance between party-centered interests and narrow-constituency interests (see discussion in Gaviria *et al*., 1999). Other political variables refer to the extent of political rights and the degree of participation of civil society. The same studies find that variables such as the number of free newspapers in circulation, indexes of press freedom and indexes of political rights generally show up significantly in regressions.

A third line of explanation in the empirical literature focuses on the existence of rents. When considering aspects of institutional quality such as the efficiency of the

[4] Of course, following our definition, these are in some sense institutions themselves. The rationale for using them as determinants of institutional efficiency would then be to focus on the strictly mechanical aspect of such rules, abstracting from their application and enforcement characteristics, and to consider them therefore as "transversal" to the concepts of institutional quality intentionally explained. Econometricians would reasonably point out the endogeneity of such variables.

[5] In theory the greater dispersion and division of power may be an argument for either more or less corruption, as discussed in Treisman (1998).

public bureaucracy, the efficiency of the judiciary system, or corruption, common sense and economic theory indicate that public officials are likely to deviate from benevolent behavior whenever there exist rents likely to be captured by them. So the existence and size of rents in the economy might be a relevant causal factor of the quality of governance. It is useful to consider two types of rents.

Natural rents are those linked to natural factor endowment or geographical conditions of a country, which by their very nature are not likely to be modified in the short term by policy makers. We label these *exogenous rents*. Straightforward examples are a country's endowment in natural resources such as oil or metals, or its endowment of land. Interest in endowments can be traced back to Sachs and Warner (1995), who found that economies with abundant natural resources tend to grow less rapidly than natural-resource-scarce economies. The rationale for this effect is that generally an important part of the rents linked to these activities accrue directly to the government and exacerbate rent-seeking behavior among public officials. Although Sachs and Warner did not initially obtain concluding evidence for the primary resource effect to work through bureaucratic efficiency, Leite and Weidmann (1999) and Ades and Di Tella (1999) do find that natural resources affect institutional efficiency.

On the other hand, non-natural rents derive from aspects of the economic organization that introduce monopolistic power in some sectors and/or lead public officials and politicians to handle or regulate rents. The size of these rents can be proxied by some broad characteristics such as the size of state-owned enterprises, the openness or, conversely, the degree of protectionism in the country, the level of existing price controls, the extent of regulatory burden and the degree of industrial concentration, among others. Although not all these factors are possibly modifiable in the short run, they are obviously involved in a complex causal interaction with institutional characteristics. To mention only one example, excessive administrative requirements such as licenses and permits provide an obvious opportunity for bureaucrats to engage in red tape and corruption, but it is also true that corruptible bureaucrats have an incentive to generate more of these requirements in order to increase their opportunities to capture rents through corrupt practices. We label this group *endogenous rents*.[6] There is more available evidence on the effect of this kind

[6] From the theoretical point of view, the relationship between rents and institutional quality is complex. In the case of competition, for example, it is not straightforward whether more of it corresponds to

of rents than the exogenous variety. The degree of openness of the economy seems a robust determinant of institutional efficiency. Ades and Di Tella (1999) find a strong negative relationship between rent indicators, among them a country's share of imports to GNP, and the level of corruption. Laffont and N'Guessan (1999) corroborate this result with a sample of African countries. Alternatively, Treisman (1998) emphasizes the number of years in the recent past that a country has been open to foreign trade. As for interventionist policies, Ades and Di Tella (1997) show that industrial policy significantly increases the prevailing level of corruption. A monopolistic feature of the industrial organization, proxied by the market valuation of the ten largest firms, is found by Treisman (1998) to be significantly linked to corruption.

The fourth set of determinants of the quality of institutions has to do with bureaucratic incentives. When opening the black box of public agencies in order to understand what shapes the behavior of public officials, bureaucratic incentives are the natural complement to rent. In complex public organizations, bureaucrats typically face decentralized power and information that is not directly verifiable by the principal, which might be considered their hierarchical superior, the highest level of the government, Congress or even the idea embodied in the constitution (Laffont and Tirole, 1993). The incentive structure then determines the opportunity cost of choices such as behaving efficiently or being corrupt. Theoretical models help to explain the interaction of different aspects of this incentive structure, namely salary, stability on the job, possibility of being promoted, risk of being caught, severity of sanction and size of the rents possibly captured. These models establish some important results for starting to think about policies; these results include the fact that it might be optimal to tolerate a certain level of corruption.[7] These results additionally show that we are

improved institutional quality, as can be seen in Bliss and Di Tella (1997) or Laffont and N'Guessan (1999).

[7] This "optimal tolerance" for corruption may arise in various settings. Laffont and N'Guessan (1999), show that with two supervisors having different opportunity cost (or degree of fear) of being corrupt, it may be better for the principal to avoid a waste of incentive payments by concentrating on less corrupt supervisors, from whom it is cheap to obtain honest behavior, and letting the others be corrupt. Olsen and Torsvik (1993) present a dynamic framework, where the repeated relationship between the principal and the agent is plagued by a potential ratchet effect, and show that in this case the prospect of collusion between the agent and the supervisor can improve the principal's welfare. Laffont and Meleu (1997) analyze reciprocal favors in a multi-agent framework and derive values of the parameters for which collusion may be desirable. The cost-benefit approach is also clearly illustrated by Mookherjee and Png (1995), who show the complex policy options for a regulator relying on a corruptible inspector monitoring pollution from factories, and by Besley and McLaren (1993), who introduce the notion of capitulation wages for cases where allowing corruption has optimal results.

faced with a complex dynamic problem involving the interaction between several dimensions of incentives (Cadot, 1987; Tirole, 1996).

Considering the previous discussion, empirical testing of this approach is obviously a difficult task. Most studies have tried to assess the effect of public sector relative wages on bureaucratic efficiency. Theory is ambiguous about this point. Simple principal-agent models often exhibit non-linear effects depending on the value of other parameters such as, for example, the degree of enforcement and the severity of sanctions. Mookherjee and Png (1995), and Panizza (1999) use an efficiency wage setting to derive a model in which the public sector wage premium is a measure of the inefficiency of the public bureaucracy. Accordingly, empirical results are not very satisfactory. La Porta *et al*. (1998), using a ratio of average public wages to GDP per capita for sixty-three countries, find that countries that pay their bureaucrats better also have less efficient governments; they attribute this result to the fact that "in countries where bureaucrats have much power, they collect both higher wages and significant bribes." Van Rijckeghem and Weder (1997), on the other hand, find the opposite result using a ratio of public salaries relative to manufacturing wages, but their sample has the serious drawback of including only 28 countries. Evans and Rauch (1999) are unable to find any significant relevance for salary variables in a still different sample of 35 developing countries. As for other dimensions of bureaucratic incentives, this is probably an area where even less data is available. Rauch (1995) uses data from the Progressive era in the United States (1902-1931) and suggests that the average time bureaucrats remain in business and the percentage of positions attributed upon formal examinations are good explanatory variables for the efficiency of the public agencies. Evans and Rauch (1999) confirm for their sample of 35 developing countries that merit-based recruitment, strong mechanisms of internal promotion and career prospects, in that order, positively affect bureaucratic efficiency.

Finally, aside from these four groups of factor variables, some factors are systematically used as control variables, for example the level of development, expressed by per capita GDP, or the level of education and health, among others, all of which are clearly endogenously related to institutional quality.

III. Data

As measures of institutional efficiency, we use an extensive data set constructed by Daniel Kaufmann, Aart Kraay and Pablo Zoido-Lobatón at the World Bank. This data set is based on the compilation of over 300 governance measures from a variety of sources, organized in six clusters, namely "Voice and Accountability" and "Political Instability and Violence" regarding the process by which authorities are selected and replaced, "Government Effectiveness"[8] and "Regulatory Burden" for the capacity of the state to implement sound policies, and "Rule of Law" and "Graft"[9] for citizens' and states' respect for the rules governing their interactions. The available indicators are aggregated along these clusters using an unobserved components model, in which the observed data are expressed as a linear function of unobserved governance plus a disturbance term corresponding to perception errors and/or sampling variation. This technique allows them to obtain a database of governance for between 155 and 173 countries, i.e., for a much broader set than any individual indicator would permit, thus reducing the risk of sample bias. Kaufmann, Kraay and Zoido-Lobatón also signal as an important feature of the model the possibility of estimating the variance of the disturbance term for each indicator.[10]

Second, since we work with four groups of independent variables, as well as control variables, there is an obvious danger of ending up with too many variables. This forces us to make some choices within groups, keeping in each case only two or three indicators. These choices can be defended, however, since our interest should not be to identify all the variables potentially influencing governance (the way variables are defined and the existence of measurement errors obviously lead us to consider this approach's limitations), but rather to identify the relevance of each group of variables. We choose to work with the following data (see Annex 1 for a detailed description of the data, including definitions, number of observations and original source).

[8] This cluster measures a mix of quality in services and infrastructure provided, predictability and credibility when committing to certain policies, and the extent of bureaucracy rigidities, delays and red tape, among others.
[9] I.e., corruption.
[10] We use the latter feature when performing multiple regression by running weighted least square (WLS), thus giving more weight to more precise and more reliable observations.

As usual, control variables are the level of GDP per capita on a PPP basis, an index of educational attainment and an index of life expectancy, all for 1995. We add to these an index of ethnolinguistic fractionalization and an index of geographic fragmentation, capturing the degree of geographic diversity in any individual country, weighted by the population in each sub-region.

As for political data, it is possible to include many different variables, such as dummies for presidential regimes, for proportional electoral rules and for federal states, or data on democratic rights and history. As stated in Weingast (1995): "The fundamental political dilemma of an economic system is this: A government strong enough to protect property rights and enforce contracts is also strong enough to confiscate the wealth of its citizens." Accordingly, what should interest us here is some measure of the characteristics of political institutions that limit (or do not limit) political discretion in a self-enforcing way. We thus take the view that the influence of the political system, be it regime or electoral rules considerations, on human and especially economic interactions, ultimately goes through the relative checks and balances between political powers and through the degree of accountability of politicians. Although it might not give credit to the richness of the political science approach, we therefore choose to restrict ourselves to three main variables: the index of political constraint developed by Henisz (1998), which measures the number of independent branches of government with veto power and indicates the feasibility of policy changes, the number of free newspapers in circulation, taken as a measure of civil society participation and monitoring pressure on the public sector, drawn from the World Bank 1998 World Development Indicators, and the index of democratic rights drawn from Polity III.

Exogenous rents are proxied by the percentage of natural resources exports in the total of exports, from Sachs and Warner (1995). Endogenous rent indicators come from a variety of sources. Openness, defined as Imports over GNP, is from World Bank 1998 World Development Indicators. To deal with the effects of development level and country size on this variable, we take as explanatory variable the residuals of the regression of Imports over GDP, on GDP per capita and country size. We also consider indexes indicating the degree of price control in the economy and the exchange rate black market premium, both constructed by Freedom House. To reduce the quantity of variables in this category, we merge these two variables in an

aggregated indicator of price distortions constructed by the method of principal components.

Finally, we initially wished to retain as indicators of bureaucratic incentives the three indicators of salary (indicating the level and evolution of bureaucratic compensation relative to the private sector), career (the possibility of having a stable and growing career path in the public sector) and merit (the extent to which public sector recruitment is meritocratic at the entry level), constructed by Rauch and Evans (1999). Unfortunately, the country coverage of these indicators is very low, leading to a listwise valid sample of only twelve countries when mixed with other variables; in addition, this sample is biased because no developed countries are included. Thus, although to our knowledge these are the only proper indexes available, we ultimately decide to drop them. Alternatively, we construct a composite index merging two indexes from the Global Competitiveness Report, indicating to what extent the bureaucracy is stable and independent from political pressures. Finally, the threat of civil servants' being sanctioned for inadequate behavior is proxied by an enforcement index, also drawn from the Global Competitiveness Report, measuring to what extent private businesses are able to successfully sue the public sector. The country coverage is slightly improved, rising to fifty-one and fifty-two, respectively. Needless to say, these data are probably the most prone to endogeneity problems, both because of the way they are built, which is very similar to other institutional indexes, and because of what they intend to grasp. We try to address this issue at the end of Section VI. Obviously, one important and difficult challenge of future empirical work will be to generate proper data on this topic.

IV. Robustness of the Results

When working with this kind of data, the first striking fact is that most results are highly sensitive to the selection of the left-hand variable. While a set of explanatory variables may be highly significant when regressing some given index of bureaucratic quality, for example, a change in the year of the index used or a shift to another similar index may completely invalidate the previous conclusions. A first partial explanation for this is the relative reliability of most institutional indicators, which happen to be constructed based on surveys of some specific population, such as

foreign businessmen, and in many cases include only a few answers for each country. Moreover, indexes differ slightly in the way questions are phrased[11] and thus may appeal to different subjective aspects for the respondents. Second, a careful study of the data shows that, in spite of a strong global correlation between different institutional aspects, huge variations sometimes appear at the level of individual countries or regions, in the sense that one particular country may score badly with respect to its neighbor on aspects such as corruption or rule of law, while having a better ranking on other aspects like regulatory burden. As a consequence the same explanatory variables may not be relevant for all aspects of institutions, and it is necessary to distinguish carefully among them. Attending to these problems, we think that the use of the Kaufmann *et al*. data set allows us to tackle, at least to some extent, both the problem of the fragility of institutional indicators and the need to distinguish among different dimensions of institutional quality.

As for the independent variables, several technical problems arise when trying to mix the different types of variables discussed. The first and most obvious limitation is the availability and quality of data. On some issues, such as bureaucratic incentives, few data exist or they exist only for reduced samples; when combining several of them, we generally end up lacking sufficient country coverage. Moreover, most studies have proceeded by combining as independent explanatory variables both objective or "hard" data such as economic aggregate, share of imports to GDP or wage ratios, and subjective data in the form of polls and responses to surveys. This might worsen the endogeneity problem. This is not to say that hard variables might not also be endogenous to some aspects of institutional quality, but the way indicators are constructed leads us to think that this problem is exacerbated when regressing, for example, corruption on an index of democratic rights, since the respondents to the surveys are very likely to be influenced by the performance of one aspect when evaluating another. For these reasons, and since it is relatively difficult to find reliable

[11] As an example, the Transparency International index for corruption is based on the following questions: "improper practices (such as bribing or corruption) in the public sphere," "level of corruption," "spread and amount of corruption in public and private business," "estimated losses caused by corruption," "likeliness to demand special and illegal payments in high and low levels of government," and "degree of misuse of public power for private benefits." On the other hand, the Global Competiveness Report corruption index questions are: "high government officials are likely to demand special payments" and "illegal payments are generally expected through lower level of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessments, policy protection, or loans."

instruments for subjective indicators, an ideal approach would be to use only objective data as right-hand variables, but this sometimes leads to data availability problems.

But the more serious obstacle of the empirical approach using cross-country data is the problem of the robustness of independent variables or, alternatively, of how to determine the right model specification. This issue has been addressed formally in the context of empirical growth literature. Following Barro (1991), cross-country regressions, like (1), have become the common methodology in this literature.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n + u \qquad (1)$$

In (1), Y is a vector of rates of economic growth and X_i, i=1,...,n, are the vectors of explanatory variables, entered linearly and independently. Among these, indicators of institutional quality have also been considered as potential explanatory variables, starting with Mauro (1995) and Knack and Keefer (1995). The vast majority of the empirical studies surveyed in Section II have also adopted this framework, introducing instead an institutional indicator as left-hand variable.

This kind of specification, however, has some drawbacks. As noted by Levine and Renelt (1992), in the context of growth regressions, the significance of a given variable X_j may vary considerably depending on what other variables X_I's are included in the regression. As long as the regression analysis is based on a strong theoretical foundation, so that the model specification is clear from the beginning, this might not be a problem. However, this is rarely the case. To reach more confident results, Levine and Renelt applied the extreme bound analysis (EBA), first advocated by Leamer (1983, 1985). They use a specification of the form:

$$Y = \alpha + \beta_i I + \beta_m M + \beta_x X + u \qquad (2)$$

where I is a set of control variables always included in the regression, M is a variable which robust partial correlation to Y is to be assessed, and X is a vector of up to three variables taken from the remaining available variables. The EBA consists of computing β_m and its standard deviation σ_m in regression (2) for the family of models formed by all possible linear combinations of up to three X-variables. The extreme upper bound is defined as the highest value of $\beta_m + 2\ \sigma_m$, and the extreme lower

bound is defined as the lowest value of $\beta_m - 2\ \sigma_m$. The variable M is then considered to be "robust" if β_m remains significant and of the same sign at the extreme bounds. In the context of their study, Levine and Renelt conclude that "almost all results (from existing studies) are fragile."

Various objections may be raised to the EBA. Without entering a detailed discussion on this issue, it should be noted with McAleer *et al*. (1985) that "selectivity in regression reporting therefore has as an exact analog in EBA the different classifications of variables as doubtful and free" (what we referred to in our notation as "X" variables and "I" and "M" variables, respectively), leading to a situation in which "if one feels unhappy with the information provided by selective regressions, one should not be any more satisfied with extreme bounds obtained by selective variable partitions." In other words, it is generally the case that, even with a narrow set of alternative assumptions (specifications), significantly varying inferences are found. This casts doubts on the possibility of selecting any convincing and uncontroversial set of assumptions (i.e., the possibility of determining any "robust" specification), even when restricting to minor changes the region where the mapping between assumptions and inferences is scrutinized. In the end, the recurrent weakness is the potential bias in selecting some restricted region/partition of the variables before applying the procedure to determine the robustness of the specification, and we are back to a rather pragmatic debate about model specification in which each position is valued mostly according to its practical relevance.

Moreover, as discussed by Sala-i-Martin (1997), the EBA procedure very easily leads to an over-pessimistic "nothing is robust" view of cross-country analysis. Considering all possible combinations of X-variables may lead in some of the regressions to important multicollinearity, thus inflating the standard error σ_m and implying too wide a range for β_m. Thus, instead of looking only at the extreme bounds, Sala-i-Martin suggests considering the entire distribution of the estimates of the coefficient β_m in model (2), seeing what fraction of their cumulative distribution function (cdf) lies on each side of zero and setting a threshold (for example, 95% of the cdf on some side) to determine the "robust" variables.

Although this approach partly solves the problem of the "extremeness" of the EBA test, it fails to provide an answer to a more fundamental problem which is inherent to model (1) and unsatisfactorily solved by the EBA test as well, namely, an

adequate way of determining the correct specification or theoretical model to be tested. Ley and Steel (1999) propose a Bayesian approach to deal with both model and parameter uncertainty, averaging over two trillion growth regressions. Their results are similar to the optimistic view of Sala-i-Martin in that they identify a set of robust variables, although the sets in the two studies do not coincide. They also claim the superiority of Bayesian model averaging (BMA) over any single model based on predictive results. The drawback of this approach, however, is that even with the use of Monte Carlo Integration techniques, performed by Ley and Steel, the practical procedure is very laborious and, to quote Greene (1997), "the complexity of the algebra involved in Bayesian analysis is often extremely burdensome." Since standard EBA almost certainly leads to a "nothing is robust" point of view, it seems both useful and legitimate to look for another procedure.

Annex 2 presents a set of preliminary regressions, which illustrate the problems mentioned above and, in particular, the fact that the significance of most variables is not robust to even slight modifications in the specification. The effect of the different levels of endogeneity among our explanatory variables is also briefly discussed. In what follows, we opt for an alternative approach, introducing in Section IV multivariate data analysis, namely factor analysis.

IV. Statistical Approach

We choose the statistical approach used here because it allows us, to some extent, to make our way around the difficulties mentioned in Section III, namely potential endogeneity and model uncertainty. Developed at the beginning of the twentieth century by psychologists seeking to understand the link between intelligence and student performances (see Sharma, 1996, for an overview), factor analysis is a data reduction techniques suited to serve many purposes. First of all, the procedure essentially considers all variables as endogenous. It is an "interdependence technique," in which, in some sense, all variables are simultaneously considered to be a dependent variable function of some underlying set of dimensions, themselves made up of all other variables. Second, exploratory factor analysis is suited for cases where the underlying factor structure or theory is unknown or unproven. It may constitute a step toward the formulation of the theoretical model and subsequent multivariate

analysis, through the statistical grouping among the set of variables under scrutiny or the identification of representative variables from a large set. Here we take advantage of both the *explanatory* purpose of the interdependence analysis (determining the structure of the model) and the *confirmatory* purpose, in the sense that we intend to validate and simplify an *a priori* conceptual grouping in the set of variables (the four groups discussed in Sections II and III), in order to subsequently return to a "dependence technique" such as multiple regression analysis (see Hair *et al.*, 1995 for more on this topic). Finally, from a practical point of view, this kind of analysis is well-suited to the characteristics of our data set, which displays high correlation among variables.[12]

In what follows, we use principal component factoring (PCF), which is one of the most popular technique of factor analysis.[13] The basic idea is to linearly transform the original variables in a few components, mutually orthogonal, accounting for most of the variation in these variables. This smaller set of new variables gives an approximation of the original set, along with a few uncorrelated characteristics. Following the notations of Jobson (1992), given a matrix A of n observations on each (centered) variable A_1, ..., A_p, we define r components Z_1, ..., Z_r, such that:

$$Z_1 = v_{11} A_1 + v_{21} A_2 + ... + v_{p1} A_p$$
$$.$$
$$.$$
$$.$$
$$Z_r = v_{1r} A_1 + v_{2r} A_2 + ... + v_{pr} A_p$$

Or in matrix notation Z = AV, V being the (p*r) matrix whose columns are constituted by the r first eigenvectors of A'A. The mutual orthogonality of the eigenvectors v_k thus implies that the principal components are also orthogonal. The sum of square and cross-product matrix Z'Z is the diagonal matrix of the r eigenvalues λ_k , k = 1, ..., r, that decline in magnitude. The result can be used to derive an

[12] Relevant tests such as the Bartlett test, not discussed in detail here, indicate that the set of variables meets the requirement for factor analysis.

[13] To be precise, many statisticians would not consider PCF to be a true factor analysis technique. PCF is essentially principal component analysis (PCA), where it is assumed that there is no unique factor and the number of components is equal to the number of variables. Thus, it is conceptually slightly different from factor analysis, although in some statistical packages (like SPSS), PCA is an option of factor analysis procedure. The basic idea of PCA is to reduce the variables to a few components that retain the maximum amount of variance in the data, while factor analysis seeks to identify the underlying, unobserved factors that explain the intercorrelation among the variable. In PCA, the

approximation $\hat{A}$ of the matrix A, given by $\hat{A} = ZV'$. Thus, the principal component approach determines V such that the sum of squared deviations between A and $\hat{A}$ is minimized, which formally implies the minimization of:

$$Tr(A - \hat{A})'(A - \hat{A}) = TrA'A - \sum_{k=1}^{s} \lambda_k$$

Then each component Z_j accounts for a proportion of the variance given by $\lambda_j / \sum_{k=1}^{s} \lambda_k$, where s is the rank of A'A, which is usually equal to p, the number of variables or columns of A. To determine the number of components that we will retain, some cut-off rule is needed. A possible criterion is to consider the components whose variance exceeds the average $\lambda^m = \sum_{k=1}^{p} \lambda_k / p$. Since we work with A'A as a correlation matrix, $\sum_{k=1}^{s} \lambda_k = p$ and $\lambda^m = 1$. Hence, we retain the components whose eigenvalues exceed 1.

At this stage, we obtain two useful sets of parameters. *Loadings* v_{ij} indicate the weights given to each variable i in the j^{th} component or factor (in fact they are the correlation between each variable and the factor) and thus allow us to interpret components. *Scores* on each component indicate for any individual observation (here for any country) to what extent it shares the characteristics corresponding to this specific component.

Finally, two additional steps are taken to obtain more easily interpretable results. First, a factor rotation is performed. The idea, known as *simple structure*, is to introduce an orthogonal transformation to the component loading matrix V so that the variables in a given category have high loadings on the same single factor, moderate to low on very few factors and negligible on the remaining ones, thus becoming more easily interpretable. One common technique is normalized varimax rotation. Second, potential outliers are identified as observations whose scores on one or more components deviate substantially from the general distribution of scores.[14] A careful interpretation implies considering both loadings (variables loadings on each component) and scores (observations scores on each component). We present the data set and the results in the Section V and discuss interpretation in Section VI.

---

variables are called *formative* indicators of the components, while in factor analysis, the variables are functions of the latent factors and may be called *reflective* indicators.

VI. Results and Discussion

We perform factor analysis for the 19 variables presented above, with a valid country coverage of 37 observations. In a second step, to obtain a broader and more representative country coverage, we drop the two bureaucratic incentives variables, which leads to 57 valid observations. Some statistics on the sample of countries are presented in Table 1.

Table 1. Characteristics of the country samples.

	N = 37	**N = 57**
Regional coverage		
Europe, North America and Oceania (EUNA)	21	21
Latin America and Caribbean (LAC)	7	18
Middle East and North Africa (MENA)	1	4
Asia (A)	7	8
Sub-Saharan Africa (SSA)	1	6
% of World Population*	49.8%	57.4%
% of World GNP*	60.1%	63.9%

* As of 1995

When all the variables are considered, three components are retained, explaining over 77% of the total variance in the data. After looking at the observations' scores, two outliers with values over 2.5 are detected. However, the factor loadings and thus the interpretation of the components remain unchanged if these outliers are eliminated. The results are relatively easy to interpret (see Table 2). The first component groups the bulk of institutional indexes, bureaucratic incentives variables, price distortions, and control variables with relatively lower loadings. This component thus appears to be a measure of the general level of institutional quality and of incentives, in the sense that countries with high scores in the first component would share the characteristic of having rather good quality institutions and a high level of development, together with good bureaucratic incentives and effective sanctions, and low distortions. High scores on the second component contrast countries with a rather democratic and equilibrated political system and a relatively

[14] More sophisticated methods are available for both factor rotations and outlier detection, but here we avoid entering into too much technical detail. See Jobson (1992) for more on this issue.

high level of development (understood as a mix of GDP per capita, index of educational attainment and life expectancy), as well as low ethnolinguistic fragmentation and low openness. Finally, high scores on the third component contrast countries with low geographic fragmentation and high openness, as well as low exports of natural resources.

Table 2. Component loadings (19 variables)

	1	2	3
Bureaucratic Incentives	.903		
CORRUPTION	.840		
Bureaucratic Sanctions	.833		
GOVERNMENT EFFECTIVENESS	.826		
RULE OF LAW	.823		
REGULATORY BURDEN	.804		
Educational Attainments	.757		
Price Distortions	.740		
POLITICAL INSTABILITY AND VIOLENCE	.723		
Newspaper Circulation	.664		
Democratic Rights		.837	
Ethnolinguistic Fragmentation		-.764	
Political Constraints		.712	
VOICE AND ACCOUNTABILITY	.606	.696	
Life Expectancy		.689	
PPPGDP95	.605	.655	
Natural Resources Exports			-.710
Openness			.698
Geographic Fragmentation			.607

Principal Component Analysis. Loadings superior to 0.55.
Rotation: Varimax with Kaiser normalization (convergence in 5 iterations).
Overall KMO measure of sampling adequacy: 0.830
Bartlett Test of Sphericity: 812.1; Significance: .000

When retaining only 17 variables, we obtain initially two components explaining 70% of the total variance in the data. The first one is again a general index of institutional quality (and low ethnolinguistic fragmentation), and the second contrasts high openness and low exports of natural resources in the context of good institutions. When correcting for one gross outlier detected,[15] one additional component is retained, the total explained variance raises to 75%, and the signification of the components is slightly modified. High scores on the first component stress mainly countries with low ethnolinguistic fragmentation, a high overall level of development and low price distortions, high scores on the second component correspond to countries with high institutional quality and low exports of

natural resources, and high scores on the third component indicate countries with low openness.

Table 3. Component loadings (17 variables)

	1	2	3
Ethnolinguistic Fragmentation	-.851		
Democratic Rights	.814		
Life Expectancy	.804		
Educational Attainments	.724		
REGULATORY BURDEN	.724		
Price Distortions	.713		
CORRUPTION		.849	
RULE OF LAW		.825	
GOVERNMENT EFFECTIVENESS		.803	
POLITICAL INSTABILITY AND VIOLENCE		.751	
Newspaper Circulation		.680	
VOICE AND ACCOUNTABILITY	.644	.664	
PPPGDP95	.643	.663	
Geographic Fragmentation		.638	
Political Constraints		.598	
Natural Resources Exports		-.556	
Openness			-.935

Principal Component Analysis. Loadings superior to 0.55.
Rotation: Varimax with Kaiser normalization (convergence in 5 iterations).
Overall KMO measure of sampling adequacy: 0.898
Bartlett Test of Sphericity: 1063.5; Significance: .000

The similarity between the two series of results is interesting in that the statistical analysis leads us to contrast repeatedly a small number of characteristics that appear with high loadings in the different components. Such is the case with the degree of openness, the level of natural resources exports, the level of price distortions, variables related to political institutions (the democracy index and to a lesser extend the polcon index), and the degree of ethnolinguistic fragmentation. When all 19 variables are included, bureaucratic incentives variables also appear important. To understand better what these results mean, we look at the average scores by geographic areas (Table 4).

[15] In all cases, the strongest outlier turns out to be Singapore, which is not surprising given the peculiarity of this country, associating high level of development, high institutional quality and high openness to otherwise contrasting characteristics, in particular with respect to political rights.

Table 4. Average components score by geographic areas

	19 Var.			17 Var.		
	Comp. 1	**Comp. 2**	**Comp. 3**	**Comp. 1**	**Comp. 2**	**Comp. 3**
Europe, North America & Oceania*	0.50	0.48	0.13	0.49	0.95	0.27
Latin America & Caribbean	-0.70	0	-1.2	0.59	-1	0
Middle east and North Africa				-1.06	-0.34	-0.25
Asia	-0.51	-1.03	0.87	-0.71	0.14	-0.8
Sub-Saharan Africa				-2.13	-0.18	0.36

* This category includes European countries (except eastern countries), the United States, Canada, New Zealand and Australia.

Translating these scores according to the previous component loadings' interpretation, it is possible to make explicit the following groups of characteristics for each geographic area, as shown in Table 5.

Table 5. Salient characteristics by geographic areas.

	19 Var.	**17 Var.**
Europe, North America and Oceania	Good institutions. Democratic and equilibrated political system. Low openness. Effective bureaucratic incentives and sanctions. Low distortions.	High level of development, with democratic and equilibrated political system. Good institutions. Low exports of natural resources. Low openness. Low distortions.
Latin America and Caribbean	Bad institutions. Intermediate to low openness. High exports of natural resources. High distortions. Inadequate bureaucratic incentives and sanctions.	Relatively high level of development, with democratic and equilibrated political system. Bad institutions. Intermediate openness. High exports of natural resources.
Middle East and North Africa	*	Low level of development and undemocratic political system, with few checks and balances. Rather bad quality institutions. High distortions. High exports of natural resources. Relatively high openness.

Table 5, *continued*		
Asia	Rather bad institutions. Rather undemocratic political system, with few checks and balances. High openness. Low exports of natural resources. High distortions. Inadequate bureaucratic incentives and sanctions.	Relatively low level of development and rather undemocratic political system, with few checks and balances. Intermediate institutional quality. High openness. High distortions.
Sub-Saharan Africa	*	Very low level of development and undemocratic political system, with few checks and balances. Very high distortions. Relatively bad institutions. Relatively high exports of natural resources. Low openness.

* No or very few observations available.

Although most of these conclusions come as no surprise, some very interesting points can be made concerning the constellations of characteristics in this table. As for the relationship between openness, one of our measures of endogenous rents, and the quality of institutions, it appears that the positive relationship traditionally displayed in the empirical literature (Ades and Di Tella, 1999) is not always confirmed by our analysis. Although it holds for Latin American and Caribbean countries, as well as Sub-Saharan countries, the reverse correlation is true for the groups of European, Asian and Middle East and North African countries. Similarly, the postulated negative relationship between the share of natural resources exports and institutional quality does not hold for Asian countries. Additionally, we can observe different combinations of level of rent and quality of bureaucratic incentives. In Europe, despite high endogenous rents (proxied by low openness), the prevalence of good bureaucratic incentives and effective sanctions presumably results in good institutions overall. Conversely, in Latin America and Caribbean, high (endogenous and exogenous) rents, bad bureaucratic incentives and ineffective sanctions prevail and, unsurprisingly, institutional quality is low. Finally, Asia displays still another combination, since relatively bad institutions arise in a context of low rents but bad bureaucratic incentives and ineffective sanctions. One possible hypothesis, on which we shall test further, is that the effect of the level of rent is dependent on the

underlying bureaucratic incentive structure. More precisely, rents seem to have less effect as the quality of incentives improves.

The same phenomenon occurs with the relationship between the characteristics of the political system (democracy index and level of checks and balances) and the quality of institutions. While the expected positive relationship holds for Europe, Middle East and North Africa, and Sub-Saharan Africa, it fails to be verified for Latin America and the Caribbean countries and is only partially verified for Asian countries.

We now want to perform a round of multiple regressions where the model specification is based on the results of the factor analysis procedure. The confirmatory part of our procedure is satisfactory since we observe in the first place a clear grouping in one general component of our institutional indexes; second, we have a subset of variables that appears to be relevant and covers in a representative way the four groups presented above. As suggested by Hair *et al*. (1995), considering the size of our sample we should retain variables for which loadings exceed 0.70. This leads us to consider the following specifications:

$$Y = \alpha + \beta_1 \textit{ control variables} + \beta_2 \textit{ ethnolinguistic fragmentation} + \beta_3 \textit{ openness} + \beta_4 \textit{ price distortions} + \beta_5 \textit{ natural resources exports} + u \quad (3)$$

and

$$Y = \alpha + \beta_1 \textit{ control variables} + \beta_2 \textit{ ethnolinguistic fragmentation} + \beta_3 (\textit{democratic rights} \text{ or } \textit{political constraints}) + \beta_4 \textit{ openness} + \beta_5 \textit{ price distortions} + \beta_6 \textit{ natural resources exports} + \beta_7 (\textit{bur. incentives} \text{ or } \textit{bur. sanctions}) + u \quad (4)$$

Thus, we have four additional specifications, numbered 4.1 to 4.4:

$$Y = \alpha + \beta_1 \textit{ control variables} + \beta_2 \textit{ ethnolinguistic fragmentation} + \beta_3 \textit{ democratic rights} + \beta_4 \textit{ openness} + \beta_5 \textit{ price distortions} + \beta_6 \textit{ natural resources exports} + \beta_7 \textit{ bur. incentives} + u \quad (4.1)$$

$$Y = \alpha + \beta_1 \textit{ control variables} + \beta_2 \textit{ ethnolinguistic fragmentation} + \beta_3 \textit{ democratic rights} + \beta_4 \textit{ openness} + \beta_5 \textit{ price distortions} + \beta_6 \textit{ natural resources exports} + \beta_7 \textit{ bur. sanctions} + u \quad (4.2)$$

$$Y = \alpha + \beta_1 \textit{ control variables} + \beta_2 \textit{ ethnolinguistic fragmentation} + \beta_3 \textit{ political constraints} + \beta_4 \textit{ openness} + \beta_5 \textit{ price distortions} + \beta_6 \textit{ natural resources exports} + \beta_7 \textit{ bur. incentives} + u \quad (4.3)$$

$$Y = \alpha + \beta_1 \textit{ control variables} + \beta_2 \textit{ ethnolinguistic fragmentation} + \beta_3 \textit{ political constraints} + \beta_4 \textit{ openness} + \beta_5 \textit{ price distortions} + \beta_6 \textit{ natural resources exports} + \beta_7 \textit{ bur. sanctions} + u \quad (4.4)$$

In each case, Y will be one of the institutional indicators. We also run an additional set of regressions with a synthetic indicator constructed as the first principal component of the four indicators related to *regulatory burden*, *government efficiency*, *rule of law* and *corruption* (see Inter-American Development Bank, 2000). The control variables include GDP level, educational level and life expectancy. These specifications are built according to the results of the factor analysis, retaining the variables that were characterized as important. The couples of variables democ95/polcon95 and incent/bursanct are not introduced simultaneously because of the high correlation between them (0.697 and 0.758 respectively) and the fact that they have closely related meanings. In the case of (4), it happens to be a quite general specification since it includes at least one variable from each group (control, political variable, exogenous and endogenous rent, bureaucratic incentive variables).

The next tables show the significance of the different variables for each institutional aspect. The method employed is weighted least square, where the weights are the variance of the institutional index used as dependent variable, in order to give more importance to more precise and thus more reliable observations. Additionally, each specification is repeated with the inclusion of regional dummies, as a way to account for the presumed regional structural differences. We also deliberately choose to present only the signs and significance of the coefficient, since we consider that with the kind of data used here, quantitative measurements make little sense. Indeed, it is common to read statements such as “an improvement in institutional quality from the level of Cameroon to that of Chile corresponds to x% additional performance on some dimension.” We take the view that such a comparison is likely to meet as many interpretations as there are readers, since the supposed difference in institutional quality between Cameroon and Chile is a highly subjective concept subject to obvious

perception bias, except, perhaps, for someone with an in depth and first-hand knowledge of these two countries.

Tables 5.1 to 5.7: Regressions based on specifications (3) and (4) -

Method: weighted least square, with the weights being the variance of the institutional indicator used as dependent variable.

Table 5.1. Dependent variable: *Voice and Accountability*

Specifications	(3) WLS	(3') WLS	(4.1) WLS	(4.1') WLS	(4.2) WLS	(4.2') WLS	(4.3) WLS	(4.3') WLS	(4.4) WLS	(4.4') WLS
Constant	-	- (c)	-	-	- (b)	- (b)	-	-	- (c)	-
PPPGDP95	+ (a)	+ (c)	+ (b)	+	+ (c)	+ (c)	+ (c)	+	+	+
Educ. Attain.	+	+	-	-	+	+	-	+	-	+
Life Expect.	+	+	-	+	+	+	-	-	+	-
Ethno. Fragm.	+	-	+	+	+	+	+	+	+	+
Democ. Rights			+ (a)	+ (a)	+ (a)	+ (a)				
Polit. Const.							+ (b)	+ (b)	+ (b)	+ (c)
Openness	- (b)	-	- (c)	-	- (c)	- (c)	- (a)	- (b)	- (a)	- (b)
Price Distort.	+	+	-	-	-	-	-	-	-	-
Nat. Res. Exp.	-	-	-	-	-	-	-	-	-	-
Bur. Incent.			+ (b)	+ (c)			+ (b)	+		
Bur. Sanct.					+ (a)	+ (b)			+ (a)	+ (c)
dummy LAC		+		+		+		-		+
dummy EUNAO		+ (a)		+ (b)		+ (b)		+		+
dummy A		-		+		+ (c)		+		+
dummy SSA		+		+ (c)		+		+		-
N	62	62	38	38	38	38	38	38	38	38
Adj. R^2	.645	.692	.808	.836	.826	.845	.775	.786	.808	.807

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table 5.2. Dependent variable: *Political Instability and Violence*

Specifications	(3) WLS	(3') WLS	(4.1) WLS	(4.1') WLS	(4.2) WLS	(4.2') WLS	(4.3) WLS	(4.3') WLS	(4.4) WLS	(4.4') WLS
Constant	+	+	-	- (b)	- (b)	- (a)	-	- (b)	- (b)	- (b)
PPPGDP95	+ (a)	+ (b)	-	-	-	-	-	-	-	-
Educ. Attain.	-	-	-	+	+	+	-	+	+	+
Life Expect.	- (b)	-	+	+ (c)	+ (c)	+ (c)	+	+ (c)	+ (c)	+ (c)
Ethno. Fragm.	-	- (c)	-	- (c)	-	- (c)	-	- (c)	-	- (b)
Democ. Rights			+	+ (b)	+	+				
Polit. Const.							+	+ (b)	+	+ (c)
Openness	+	+	+	+	+ (c)	-	+	-	+ (c)	-
Price Distort.	+ (a)	+ (a)	+	+	+	+	+	+	+	+
Nat. Res. Exp.	-	-	-	-	-	-	-	-	-	-
Bur. Incent.			+ (a)	+ (b)			+ (a)	+		
Bur. Sanct.					+ (a)	+ (c)			+ (a)	+
dummy LAC		-		+		+		-		-
dummy EUNAO		+ (b)		+ (c)		+		+		+
dummy A		+		+ (b)		+ (a)		+ (b)		+ (b)
dummy SSA		+ (a)		+ (a)		+ (b)		+ (b)		+ (b)
N	62	62	38	38	38	38	38	38	38	38
Adj. R^2	.624	.664	.649	.751	.639	.733	.661	.756	.654	.750

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table 5.3. Dependent variable: *Government Effectiveness*

Specifications	(3) WLS	(3') WLS	(4.1) WLS	(4.1') WLS	(4.2) WLS	(4.2') WLS	(4.3) WLS	(4.3') WLS	(4.4) WLS	(4.4') WLS
Constant	+	+	- (c)	-	- (a)	- (a)	-	-	- (a)	- (a)
PPPGDP95	+ (a)	+ (a)	+	+	+	+	+	+	+	+
Educ. Attain.	-	-	-	-	+	+	-	-	+	+
Life Expect.	-	-	+ (b)	+ (c)	+ (a)	+	+ (b)	+	+ (a)	+
Ethno. Fragm.	+	+	+	+	+	+	+	+	+	+
Democ. Rights			+	+	-	-				
Polit. Const.							+	-	-	-
Openness	+	+ (c)	+	+	+ (c)	+	+	+	+ (b)	+
Price Distort.	+ (a)	+ (a)	+	+	+	+	+	+	+	+
Nat. Res. Exp.	-	+	+	-	-	-	+	-	-	-
Bur. Incent.			+ (a)	+ (a)			+ (a)	+ (a)		
Bur. Sanct.					+ (a)	+ (a)			+ (a)	+ (a)
dummy LAC		- (b)		+		+		+		+
dummy EUNAO		+ (b)		+ (c)		+ (c)		+ (c)		+ (b)
dummy A		-		+		+		-		+
dummy SSA		-		+		-		-		-
N	62	62	38	38	38	38	38	38	38	38
Adj. R^2	.790	.830	.873	.874	.860	.872	.871	.873	.860	.876

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table 5.4. Dependent variable: *Regulatory Burden*

Specifications	(3) WLS	(3') WLS	(4.1) WLS	(4.1') WLS	(4.2) WLS	(4.2') WLS	(4.3) WLS	(4.3') WLS	(4.4) WLS	(4.4') WLS
Constant	+	+	-	+	-	+	-	+	-	+
PPPGDP95	+	-	+	+	+	+	+	+	+	+
Educ. Attain.	+	+	+	+	+	+	+	+	+	+
Life Expect.	+	-	+	-	+	-	+	-	+	-
Ethno. Fragm.	-	-	+	+	+	+	+	+	+	+
Democ. Rights			+	-	+	-				
Polit. Const.							-	-	-	-
Openness	+ (a)	+ (a)	+	+ (b)	+	+ (c)	+	+ (b)	+	+ (b)
Price Distort.	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)
Nat. Res. Exp.	-	-	+	+	-	+	-	+	-	+
Bur. Incent.			+	+			+	+		
Bur. Sanct.					+	+			+	+
dummy LAC		+ (c)		-		-		-		-
dummy EUNAO		+ (b)		+		+		+		+
dummy A		-		-		-		-		-
dummy SSA		+		- (b)		- (b)		- (b)		- (a)
N	62	62	38	38	38	38	38	38	38	38
Adj. R^2	.692	.711	.771	.792	.776	.802	.761	.796	.771	.812

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table 5.5. Dependent variable: *Rule of Law*

Specifications	(3) WLS	(3') WLS	(4.1) WLS	(4.1') WLS	(4.2) WLS	(4.2') WLS	(4.3) WLS	(4.3') WLS	(4.4) WLS	(4.4') WLS
Constant	+	-	+	- (b)	- (a)	- (a)	+	-	- (a)	- (a)
PPPGDP95	+ (a)	+ (a)	+ (c)	+	+	+	+ (c)	+	+	+
Educ. Attain.	-	+	-	-	+	+	-	-	+	+
Life Expect.	-	+	-	+ (b)	+	+	-	+	+	+
Ethno. Fragm.	-	-	+	-	+	-	+	-	+	-
Democ. Rights			+	+ (a)	+	+				
Polit. Const.							+	+ (c)	-	+
Openness	+	+	+ (c)	+	+ (b)	+	+	+	+ (b)	-
Price Distort.	+ (c)	+ (a)	-	+	-	+	-	+	-	+
Nat. Res. Exp.	- (c)	+	+	+	-	+	+	+	-	+
Bur. Incent.			+ (a)	+ (a)			+ (a)	+ (a)		
Bur. Sanct.					+ (a)	+ (a)			+ (a)	+ (a)
dummy LAC		- (a)		-		-		- (b)		-
dummy EUNAO		-		-		-		-		-
dummy A		-		+		+ (b)		+		+ (c)
dummy SSA		+		+ (a)		+ (b)		+ (b)		+
N	62	62	38	38	38	38	38	38	38	38
Adj. R^2	.742	.814	.860	.929	.868	.908	.847	.902	.866	.902

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table 5.6. Dependent variable: *Corruption*

Specifications	(3) WLS	(3') WLS	(4.1) WLS	(4.1') WLS	(4.2) WLS	(4.2') WLS	(4.3) WLS	(4.3') WLS	(4.4) WLS	(4.4') WLS
Constant	-	-	+	-	- (a)	- (a)	+	-	- (a)	- (a)
PPPGDP95	+ (a)	+ (a)	+ (c)	-	+	+	+ (c)	+	+	+
Educ. Attain.	-	+	-	-	+	+	-	-	+	+
Life Expect.	-	-	+	+ (c)	+ (b)	+ (c)	+	+	+ (b)	+ (c)
Ethno. Fragm.	+	-	+	+	+	+	+	+	+	+
Democ. Rights			+	+	-	-				
Polit. Const.							-	+	-	-
Openness	+	+	+	+	+	+	+	+	+ (c)	+
Price Distort.	+ (b)	+ (a)	+	+	+	+	+	+	+	+
Nat. Res. Exp.	-	-	+	+	+	+	+	+	+	+
Bur. Incent.			+ (a)	+ (a)			+ (a)	+ (a)		
Bur. Sanct.					+ (a)	+ (a)			+ (a)	+ (a)
dummy LAC		- (a)		-		+		-		+
dummy EUNAO		+ (b)		+		+		+		+
dummy A		-		-		+		-		+
dummy SSA		+		+ (b)		+		+		+
N	62	62	38	38	38	38	38	38	38	38
Adj. R^2	.738	.824	.859	.904	.923	.918	.856	.893	.924	.920

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table 5.7. Dependent variable: *Synthetic Institutional Index*

Specifications	(3) OLS	(3') OLS	(4.1) OLS	(4.1') OLS	(4.2) OLS	(4.2') OLS	(4.3) OLS	(4.3') OLS	(4.4) OLS	(4.4') OLS
Constant	+	-	-	-	- (a)	- (a)	-	-	- (a)	- (a)
PPPGDP95	+ (a)	+ (a)	+ (c)	+	+	+	+ (c)	+	+	+ (c)
Educ. Attain.	-	+	-	-	+	+	-	-	+	+
Life Expect.	-	-	+	+ (c)	+ (a)	+	+	+	+ (a)	+
Ethno. Fragm.	-	-	+	+	+	+	+	+	+	+
Democ. Rights			+	+ (c)	+	+				
Polit. Const.							-	+	-	-
Openness	+	+ (b)	+ (c)	+ (b)	+ (b)	+	+	+	+ (a)	+
Price Distort.	+ (a)	+ (a)	+	+	+ (c)	+ (c)	+	+	+ (c)	+
Nat. Res. Exp.	-	+	+	+	-	+	+	+	-	+
Bur. Incent.			+ (a)	+ (a)			+ (a)	+ (a)		
Bur. Sanct.					+ (a)	+ (a)			+ (a)	+ (a)
dummy LAC		- (a)		-		-		-		+
dummy EUNAO		+ (c)		+		+		+		+
dummy A		-		-		+		-		+
dummy SSA		-		+		+		+		-
N	62	62	38	38	38	38	38	38	38	38
Adj. R^2	.811	.862	.911	.925	.929	.928	.906	.915	.930	.930

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

A first general observation on these results is that the adjusted R^2 are systematically very high, indicating good explanatory power of the models tested. However, it appears that some variables have a tendency to change sign with small modifications of the specifications. Such is, in particular, the case of the control

variables. Our indicator of exogenous rents, the level of natural resources exports, is also very prone to this problem.

Table 6. Results: significant determinants of institutional quality according to (3) and (4) (Variables systematically significant are in bold letters)

Voice and accountability	*GDP per capita.* ***Democratic rights.*** ***Political constraints.*** *Openness.* *Bureaucratic Incentives.* ***Bureaucratic Sanctions.***
Political Instability and Violence	*Ethnolinguistic fragmentation.* *Democratic rights.* *Political constraints.* *Price distortions.* *Bureaucratic.Incentives.* *Bureaucratic sanctions.*
Government effectiveness	*GDP per capita.* *Ethnolinguistic fragmentation.* *Openness.* *Price distortions.* ***Bureaucratic Incentives.*** ***Bureaucratic Sanctions.***
Regulatory Burden	*Educational attainment.* ***Openness.*** ***Price distortions***
Rule of law	*GDP per capita.* *Democratic rights.* ***Bureaucratic Incentives.*** ***Bureaucratic sanctions.***
Corruption	*Openness.* *Price distortions.* ***Bureaucratic Incentives.*** ***Bureaucratic Sanctions.***
Synthetic index	*GDP per capita.* *Openness.* *Price distortions.* ***Bureaucratic Incentives.*** ***Bureaucratic Sanctions.***

As for each institutional dimension, the following results are observed. As expected, *Voice and Accountability* is positively and significantly affected by the quality of bureaucratic incentives and sanctions, as well as by the quality of political checks and balances, the prevailing degree of democracy, and the level of GDP per capita. Counterintuitively, however, the coefficient of the degree of openness is negative (as is the coefficient of the level of price distortions) and generally significant, which would imply that higher endogenous rents lead to improved

institutional quality in this aspect. *Political Instability and Violence* is again best explained by the quality of bureaucratic incentives and sanctions, as well as political variables and the level of price distortions (although less significantly). As expected, *Government Effectiveness* is positively and very significantly affected by the quality of bureaucratic incentives and sanctions. Endogenous rents (openness and price distortions) display positive coefficients, meaning that lower rents correspond to higher effectiveness, but these are not always significant. As for *Regulatory Burden*, the only explanatory variables showing up as significant is endogenous rents, i.e., the degree of openness and of price distortions. It is, however, clear that in this case the potential endogeneity of these variables should be addressed. *Rule of Law* is positively affected by the quality of bureaucratic incentives and sanctions (always significant at the 1% level), the level of development, the degree of openness and the index of democratic rights (all significant in some cases). *Corruption* is mostly explained by the quality of bureaucratic incentives and sanctions (always significant at the 1% level). As for the level of rents, endogenous rents are of the expected sign, although generally not significant. On the other side, exogenous rents (exports of natural resources) are of the wrong sign in specifications 4.1 to 4.4, leading us to question the results of the literature discussed previously. Finally, our synthetic index displays characteristics similar to *Government effectiveness* and *Corruption*, with bureaucratic incentives variables again being the most significant, while GDP per capita and measures of endogenous rents appear to matter to a lesser extent.

As for the regional dummy variables, developed countries (grouped in EUNA) display positive signs in all aspects, meaning that their institutions are of better quality than the fundamentals would predict according to the model, except with respect to rule of law, where a negative sign prevails. No clear pattern emerges for Latin American countries, although the sign of the LAC dummy is mostly negative overall. Sub-Saharan countries have a positive advantage with respect to rule of law (as Asian countries do) but a negative sign with respect to regulatory burden.

One puzzling feature unveiled by the factor analysis was the relationship between rents and bureaucratic incentives. Clearly, from a theoretical point of view, the interaction between rents and incentives should matter. It may be conjectured that, in many cases, the effects of rents operate through the incentive structure (as shown by the factor analysis, the effect of rents seems conditional on the prevailing quality of incentives); thus the inclusion of incentive variables should lead the rent coefficients

to lose their significance. Indeed, this happens with the coefficient of price distortions in tables 5.2, 5.3, 5.5, 5.6 and 5.7. To be more precise, we want to test the quality of this interaction. A first plausible hypothesis is that the effect of rents on the quality of institutions may change sign above a certain threshold, as conjectured, for example, in Laffont and N'Guessan (1999). We intend to test for this effect including a quadratic term (square of the rent variable), which should then be of negative sign. Results are shown in Table 7, which gives no good support for this hypothesis.

Table 7. OLS with quadratic rent term

Dependent Variable	Gov. Eff.	Gov. Eff.	Reg. Burden	Reg. Burden	Corruption	Corruption
	OLS	OLS	OLS	OLS	OLS	OLS
Constant	- (a)	-	+	+	- (a)	-
PPPGDP95	+	+ (a)	+	+	+	+ (a)
Educ. Attain.	+	-	+	+	+	-
Life Expect.	+ (a)	-	+	+	+ (b)	-
Ethno. Fragm.	+	+	-	-	+	+
Democ. Rights		-				
Polit. Const.	-				-	
Openness	+	+	+	+ (b)	+	+
Price Distort.	+	+	+ (a)	+ (b)	+	-
Nat. Res. Exp.	-	-	-	-	+	-
Bur. Incent.						
Bur. Sanct.	+ (a)				+ (a)	
Openness^2	+		-		+	
Pric. Distort.^{2}		+		-		+
Based on specif.	(4.4)	(3)	(3)	(3)	(4.4)	(3)
N	38	62	62	62	38	62
Adj. R^2	.855	.787	.689	.688	.921	.737

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Alternatively, a conjecture consistent with the stylized facts of the factor analysis is that the magnitude of the effect of rent variables would depend on the quality of incentives, in the sense that rents would matter mostly when incentives are bad or nonexistent but would have a smaller impact when a good bureaucratic incentive structure prevails. To test this hypothesis, we introduce various interaction terms between incentives and rents. If it is true that, the higher the incentives are, the lower the effects of the rents, the coefficients of the interaction terms should be negative, as shown by the following reduced form:

$$Y = \beta_0 + \beta_1 \text{ Incentive} + \beta_2 \text{ Rent} + \beta_3 \text{ (Incentive*Rent)}$$

$$\Rightarrow \quad dY/d\text{Rent} = \beta_2 + \beta_3 \text{ Incentive}$$

Again the results, displayed in Table 8 are far from supportive of this hypothesis. In fact, the coefficients of the interaction terms are often positive and not significant.

Table 8. OLS with interaction term (incentives*rents)

Dependent Var.	Gov. Eff.	Gov. Eff.	Gov. Eff.	Gov. Eff.	Corruption	Corruption	Corruption	Corruption
	WLS	WLS	WLS	WLS	WLS	WLS	WLS	WLS
Constant	-	- (a)	- (c)	- (a)	+	- (a)	-	- (a)
PPPGDP95	+	+	+	+	+ (c)	+	+ (b)	+
Educ. Attain.	-	+	-	+	-	+	- (c)	-
Life Expect.	+ (c)	+	+ (b)	+ (b)	+	+ (b)	+	+ (b)
Ethno. Fragm.	+	+	+	+	+	+	+	+
Democ. Rights								
Polit. Const.	+	-			-	-		
Openness	+	+	+	+	+	+	-	+
Price Distort.	+	+	-	-	+	+	-	-
Nat. Res. Exp.	+	-	-	-	+	+	+	+
Bur. Incent.	+ (a)		+		+ (a)		-	
Bur. Sanct.		+ (a)		-		+ (a)		+
Inc.*Open.	**+**				**-**			
Inc.*Pric.			**+**				**+ (c)**	
Sanct.*Open.		**+**				**+**		
Sanct.*Pric.				**+**				**+**
Based on specif.	(4.3)	(4.4)	(3)	(3)	(4.1)	(4.4)	(3)	(3)
N	38	38	40	40	38	38	40	40
Adj. R^2	.867	.855	.867	.819	.853	.922	.870	.890

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Finally, we want to address the potential endogeneity of the incentive variables, which stems in particular from the fact that our variables are themselves surveys based on indicators from the World Development Report and that the respondents to these surveys might obviously be influenced by other institutional characteristics of the country when qualifying it on some given aspects. Following discussions in La Porta *et al*. (1998) and Treisman (1998), we decide to use as instruments for our bureaucratic incentives and sanctions variables the two dummy variables corresponding to either the English or French origin of the legal code. The rationale for this is that the common law system (English origin) initially developed as a means to protect individuals against state discretion, whereas civil law systems, at the time of Napoleon and Bismarck, were thought of as an instrument for the state to control economic life. Thus we might reasonably expect the English legal code dummy to display a positive correlation with our variable indicating better checks on bureaucrats' discretion, while the French legal code dummy should naturally be

negatively correlated with our measure of incentives, which corresponds to the degree of independence from political pressures and the stability of the public service. On the other hand, although previous studies would suggest a high correlation between our two instrumental variables and some measure of institutional quality, like corruption, both variables appear not to be significant predictors of our broader measures of institutional quality, as shown both by the regressions in Annex 2, where they have no explanatory power, and Table 9, which presents the correlation among the variables under consideration. We thus use the variable *English Origin* as an instrument for *Bureaucratic Sanctions* when the dependent variables are *Voice and Accountability, Government Effectiveness, Rule of Law, Corruption* and our *Synthetic Index*. *French Origin* is used to instrument *Bureaucratic Incentives* with *Voice and Accountability, Government Effectiveness, Corruption* and the *Synthetic Index* as dependent variables.

Table 9. Correlation between Legal code dummies, incentive variables and institutional quality

	Bureaucratic Incentives	Bureaucratic Sanctions	Voice and Accountability	Government Effectiveness	Rule of Law	Corruption	Synthetic Index
French Origin	-0.377 (a)	.0.375 (a)	-0.121	-0.080	-0.212 (a)	-0.185 (b)	-0.132
English Origin	0.252	0.374 (a)	0.053	0.065	0.139	0.154	0.127

a: significant at the 1% level
b: significant at the 5% level

The results from the Two Stage Least Square are in table 10 and 11. The coefficients of the bureaucratic incentives and sanctions variables are of the expected sign in all cases but fail to be significant. The two variables showing out as significant and with the expected signs are the level of GDP per capita and one of our measure of endogenous rents, the index of price distortions, as well as the index of democratic rights when the dependent variable is *Voice and Accountability.* These results are thus not very robust and lead us to think that stronger evidence on the effect of the bureaucratic incentive structure would require either better instruments, which are difficult to find, or the elaboration of better incentive indicators based on structural measures.

Table 10. TSLS (instrumenting *bureaucratic sanctions* variable)

Dependent Variable	KAUFVOIC	KAUFEFF	KAUFRUL	KAUFCORR	SYNT. INDEX
	TSLS	TSLS	TSLS	TSLS	TSLS
Constant	-	-	+	-	-
PPPGDP95	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)
Educ. Attain.	+	-	-	-	-
Life Expect.	-	-	-	-	-
Ethno. Fragm.	...	-	...	...	...
Democ. Rights	+ (a)	-	+	-	+
Openness	-	+	+	+	+
Price Distort.	+	+ (a)	+ (b)	+ (b)	+ (a)
Nat. Res. Exp.	-	-	-	-	-
BUR. SANCT.	**+**	**+**	**+**	**+**	**+**
Based on specif.	4.1-4.2	4.1-4.2	4.1-4.2	4.1-4.2	4.1-4.2
N	60	60	60	60	60
Adj. R^2	.790	.794	.744	.735	.811

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table 11. TSLS (instrumenting *bureaucratic incentives* variable)

Dependent Variable	KAUFVOIC	KAUFEFF	KAUFCORR	SYNTH. INDEX
	TSLS	TSLS	TSLS	TSLS
Constant	+	+	+	+
PPPGDP95	+ (a)	+ (a)	+ (a)	+ (a)
Educ. Attain.	-	-	-	-
Life Expect.	...	...	...	...
Ethno. Fragm.	-	+	-	-
Democ. Rights	+ (a)	-	-	+
Openness	-	+	+	+
Price Distort.	+ (c)	+ (a)	+ (b)	+ (a)
Nat. Res. Exp.	+	-	+	+
BUR. INCENT.*	**-**	**-**	**-**	**-**
Based on specif.	4.1-4.2	4.1-4.2	4.1-4.2	4.1-4.2
N	60	60	60	60
Adj. R^2	.790	.794	.735	.811

* The negative sign displayed is due to the fact that the instrumental variable is negatively correlated with the variables being instrumented.
a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

VII. Conclusion

After reviewing the existing literature on the determinants of institutional quality and discussing the usual robustness checks employed in it, we developed a statistical approach to gain some insights into the right model specification. Based on the results of this factor analysis, we performed multiple regression analysis and tested for non-linear effects by introducing quadratic and interaction terms. Finally, we addressed the potential endogeneity of the bureaucratic incentive variables by running Two Stage Least Squares.

As inferring from the factor analysis and the general set of regressions in Section VI, the strongest result seems to be the high degree of significance of the bureaucratic incentives and sanctions variables, which happen to be relevant for five out of the six aspects of institutional quality analyzed. In a first approximation, our analysis thus gives more weight to the idea that in order to account for many institutional aspects it should be a priority to reach a good understanding of the incentive structure facing economic agents. When looking at the broader picture, however, various caveats lead us to question the robustness of the previous results as well as those of the existing literature to date. First, exogenous rents proxied by natural resources exports and to a lesser extent endogenous rents appear not to be robust explanatory factors of institutional quality. Second, different kinds of interactions and non-linear effects, which might help to understand the lack of robustness pointed out in the first remark–and ought to be precisely the most meaningful piece of information from the theorist's point of view–yield no interpretable results. Finally, no significant estimations arise when instrumenting incentives variables, although in this case the difficulty of finding suitable instruments must be remembered.

These conclusions raise some issues and suggest potential lines of research. It first points out to the still fragile quality of the data available. In the empirical field, a next important step would be the construction of more reliable incentive indicators, based on structural features of relevant organizations rather than subjective surveys, with broad country coverage, and accounting for more precise characteristics of the incentive structure. This could then be completed by the introduction of other aspects such as the nature of the political game, the size and nature of existing rents to be allocated, and the exact nature of the interaction between incentives and rents. An

alternative approach would be to look carefully at case studies in order to ascertain the relative and/or joint impact of institutional reforms oriented toward improving incentives or the competitive conditions (rent allocation mechanism) of the economy, as suggested, for example, in Stiglitz (1999). Finally, an important dimension that is at best only implicit in cross-country empirical studies has to do with the dynamic of institutional change. It would be worthwhile in particular to look at how a given set of institutional characteristics interacts with the process and the direction of learning by economic agents in order to shape the path of development. In all cases, a better understanding of these issues at the theoretical level is probably a prerequisite for significant progress in this field.

ANNEX 1. Description of the Variables

Variable name	Description and source	Size of sample
	Indicators of institutional quality	
Voice and accountability	Source: Kaufmann, Kray and Zoido-Lobatón (1999a). Higher score indicates better institutional quality.	171
Political instability and violence	Idem.	153
Government effectiveness	Idem.	154
Regulatory burden	Idem.	164
Rule of law	Idem.	164
Graft/corruption	Idem.	153
	Control variables	
PPPGDP95	An index of Purchasing Power Parity estimates of GDP per capita in 1995 in constant 1987 dollars. Source: Inter-American Development Bank. The index uses the diminishing returns formula proposed by Noorbakhsh (1998).	128
Educational Attainment	Educational Attainment index, 1995. For non-OECD countries, Average of Literacy and Gross Enrollment indices. For OECD countries the educational attainment index combines literacy and mean years of schooling for 1980-90 and literacy and combined primary, secondary and tertiary enrollment for 1995. The data for gross enrollment all levels comes from the UNDP Human Development Report; literacy data for OECD comes from the UNDP HDR, while literacy data for non-OECD members comes from the World Bank, World Development Indicators; mean years of schooling for the OECD countries comes from the UNDP Human Development Report. Source: Inter-American Development Bank.	106
Life Expectancy	Life expectancy for 1995. (Max: 80; Min: 35); Life expectancy is the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. Source: Inter-American Development Bank.	202
Ethnolinguistic Fragmentation	Ethnolinguistic fragmentation, taken from Easterly and Levine (1997). Higher score indicates more fragmentation.	155
Geographic Fragmentation	Index of geographic fragmentation, weighted by the size of population in each sub-region. Source: John Gallup and Jeffrey Sachs, Harvard Institute for International Development. Higher score indicates less fragmentation.	144
Legal Code Origin Dummies	Dummies distinguishing countries according to the origin of their legal code, in five groups: French, English, German, Scandinavian, and Socialist. Source: La Porta *et al*. (1998).	205
	Political structure and rules	
Political Constraints	Index of political constraint, 1995 (Henisz, 1998). Measures the number of independent branches of government with veto power and thus indicates the feasibility of policy changes or the level of restraints on the executive discretion. Higher score indicates more checks and balances.	149
Newspaper Circulation	Number of free newspapers in circulation per 1,000 hab. (World Development Indicators, World Bank 1998). Proxy for civil society participation and monitoring pressure on the public sector.	174
Democratic Rights	Index of Democratic Rights Drawn from Polity III. Source: Jaggers and Gurr (1995). Higher scores indicate more democratic rights.	148
	Size of rents in the economy	
Natural Resources Exports	Natural resources exports as a share of total exports. Source: Sachs and Warner (1995).	91

Description of variables, *continued*		
Openness	Openness, defined as Imports over GNP, from World Bank 1998 World Development Indicators. To deal with the effect of development level and country size on this variable, we take as explanatory variable the residuals of the regression of Imports over GDP, on GDP per capita and country size.	115
Price Distortions	Aggregated indicator of price distortions constructed by the method of principal components with two indexes indicating the degree of price control in the economy and the exchange rate black market premium. Source: Freedom House. Higher scores indicate smaller distortions.	119
	Incentive variables	
Bureaucratic Incentives	Composite incentive index merging indexes indicating to what extent the bureaucracy is independent from political pressures, and the bureaucracy's stability. Higher scores indicate better incentives. Source: World Competitiveness Report 1998.	51
Bureaucratic Sanctions	Threat of civil servants' being sanctioned for inadequate behavior, proxied by an enforcement index measuring to what extent private business is able to successfully sue the public sector. Higher score indicates better enforcement. Source: World Competitiveness Report 1998.	52

ANNEX 2. Preliminary Analysis: Multiple Regression Output

We proceed to a first round of regressions in which we take together the set of control variables and historical variables in order to determine for each aspect of governance the basic controlling set to be included in all further regressions. In addition to the data discussed in Section III, dummies for five legal origins (English common law, Socialist law, French, German and Scandinavian civil law[16]) are drawn from La Porta *et al*. (1998). Following La Porta *et al*., tests showing that legal origin and religious affiliation are correlated with each other; as the latter almost always becomes insignificant when entered in a common specification, we omit religious variables. The results are shown in table A.2.1. Surprisingly, the origin of the legal code and the index of ethnolinguistic fractionalization, most often emphasized in recent studies (La Porta et al.; Treisman, 1998) as important determinants of institutional quality, are generally not significant in our sample.

Table A.2.1. Basic set of control variables

Voice and Accountability	GDP per capita Educational attainment Scandinavian legal code dummy Socialist legal code dummy
Political Instability and Violence	GDP per capita Geographic fragmentation
Government Effectiveness	GDP per capita Geographic fragmentation
Regulatory Burden	GDP per capita Educational attainment
Rule of Law	GDP per capita Geographic fragmentation French legal code dummy
Corruption	GDP per capita Geographic fragmentation Socialist legal code dummy French legal code dummy

In a second step, we complete this basic set by successively introducing variables belonging to the different groups in the following order: political variables (since they prove to be highly correlated, we introduce them alternatively, one at a time), rent variables and finally, after determining the seemingly best specification,

[16] In our sample, 68 countries belong to English common law tradition, 34 to Socialist law, 92 to French civil law, 6 to German civil law and 5 to Scandinavian civil law.

bureaucratic incentive variables. The results are shown in the following tables. In all cases, the R^2 statistics are good and increase as more independent variables enter the specification, indicating an increase in explanatory power. Few variables remain significant overall. Bureaucratic incentives are generally so (except when explaining *Regulatory Burden*), as is the level of GDP per capita in most cases, *democratic rights* when explaining *Voice and Accountability*, and proxies of endogenous rents when regressing *Regulatory Burden*. The striking fact is that for five of the six dependent variables, with the exception of *Voice and Accountability*, the variables introduced first (control, rents, political) lose significance and even change sign when incentive variables are introduced. Among control variables, only the level of GDP generally retains its significance. It thus seems that, as we suggested in Section II when discussing the first group of studies, the lack of robustness of these more exogenous variables is due to the fact that they are accounted for by the incentive variables, which are intuitively the more endogenous of our explanatory variables. However, the attempt to determine which variables are accounted for by which other variables in such a complex framework can at best only lead to tentative explanations. The door remains open for a Levine and Renelt type of criticism, so we need a more convincing approach.

Table A.2.2. Dependent variable: *Voice and Accountability*

	WLS	WLS	WLS	WLS	WLS	WLS
Constant	- (a)	- (a)	- (a)	- (b)	-	- (a)
PPPGDP95	+	+ (a)	+ (a)	+ (a)	+ (b)	+ (a)
Educ. Attain.	+ (b)	+	+ (b)	+	-	+
Scand. dummy	+ (c)	+ (c)	+	+ (c)	+	+
Social. dummy	-	-	- (c)	-	-	-
Polit. Const.	+ (a)					
Democ. Rights		+ (a)		+ (a)	+ (a)	+ (a)
Newspaper			+			
Openness				+		
Price Distort.				+		
Nat. Res. Exp.				-		
Bur. Incent.					+ (b)	
Bur. Sanct.						+ (a)
N	87	87	89	60	40	40
Adj. R^2	0.622	0.779	0.554	0.795	0.808	0.824

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table A.2.3. Dependent variable: *Political Instability and Violence*

	WLS	WLS	WLS	WLS	WLS	WLS
Constant	- (a)	- (a)	- (a)	- (b)	-	- (a)
PPPGDP95	+ (a)	+ (a)	+ (a)	+ (a)	+	+ (b)
Geogra. Fragm.	+ (c)	+ (c)	+	+	+	+
Polit. Const.	+ (a)					
Democ. Rights		+ (a)		+	+	+
Newspaper			+ (b)			
Openness				+ (c)	+	+
Price Distort.				+ (a)	+	+
Nat. Res. Exp.				-		
Bur. Incent.					+ (a)	
Bur. Sanct.						+ (b)
N	95	95	96	67	43	43
Adj. R^2	0.599	0.590	0.590	0.648	0.650	0.604

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table A.2.4. Dependent variable: *Government Effectiveness*

	WLS	WLS	WLS	WLS	WLS	WLS
Constant	- (a)	- (a)	- (a)	- (a)	-	- (a)
PPPGDP95	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)
Geogra. Fragm.	+ (a)	+ (a)	+ (b)	+	+	+
Polit. Const.	+					
Democ. Rights		+				
Newspaper			+ (a)	+ (c)	-	+
Openness				+		
Price Distort.				+(a)	+	+
Nat. Res. Exp.				-		
Bur. Incent.					+ (a)	
Bur. Sanct.						+ (a)
N	95	95	96	67	43	43
Adj. R^2	0.663	0.661	0.667	0.781	0.825	0.761

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table A.2.5. Dependent variable: *Regulatory Burden*

	WLS	WLS	WLS	WLS	WLS	WLS
Constant	- (a)	- (a)	- (a)	-	-	-
PPPGDP95	-	+	+	-	+ (c)	+ (b)
Educ. Attain.	+ (a)	+ (a)	+ (a)	+	+	+
Polit. Const.	+ (a)					
Democ. Rights		+ (a)		+ (a)	+	+
Newspaper			+			
Openness				+ (a)	+ (b)	+ (b)
Price Distort.				+ (a)	+ (a)	+ (a)
Nat. Res. Exp.				+		
Bur. Incent.					+	
Bur. Sanct.						+
N	85	85	88	60	40	40
Adj. R^2	0.612	0.641	0.552	0.714	0.798	0.799

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table A.2.6. Dependent variable: *Rule of Law*

	WLS	WLS	WLS	WLS	WLS	WLS
Constant	- (a)	- (a)	- (a)	- (a)	-	- (a)
PPPGDP95	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)
Geog. Fragm.	+	+	+	+	+ (c)	+ (b)
French dummy	- (a)	- (a)	- (a)	-	-	-
Polit. Const.	+					
Democ. Rights		+				
Newspaper			+	+	+	+
Openness				+		
Price Distort.				+ (b)	-	+
Nat. Res. Exp.				-		
Bur. Incent.					+ (a)	
Bur. Sanct.						+ (a)
N	98	98	99	67	43	43
Adj. R^2	0.752	0.749	0.765	0.781	0.850	0.799

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Table A.2.7. Dependent variable: *Corruption*

	WLS	WLS	WLS	WLS	WLS	WLS
Constant	- (a)	- (a)	- (a)	- (c)	- (c)	- (a)
PPPGDP95	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)	+ (a)
Geog. Fragm.	+ (b)	+ (b)	+ (c)	+	+	+ (b)
Social. dummy	- (b)	- (b)	- (b)	- (c)	-	-
French dummy	- (a)	- (a)	- (a)	- (a)	-	-
Polit. Const.	+					
Democ. Rights		+				
Newspaper			+ (a)	+ (c)	-	+
Openness				+		
Price Distort.				+		
Nat. Res. Exp.				-	+	+
Bur. Incent.					+ (a)	
Bur. Sanct.						+ (a)
N	95	95	96	67	41	41
Adj. R^2	0.720	0.723	0.719	0.791	0.860	0.885

a: significant at the 1% level
b: significant at the 5% level
c: significant at the 10% level

Bibliography

Ades, A. and Di Tella, R. 1999. "Competition and Corruption." *American Economic Review*. 89 (4): 982-993.

----. 1997. "National Champions and Corruption: Some Unpleasant Interventionist Arithmetic." *Economic Journal*. 107: 1023-1042.

Barro, R. 1991. "Economic Growth in Cross Section of Countries." *Quarterly Journal of Economics*. 106 (2): 407-443.

Besley, T. and McLaren, K. 1993. "Taxes and Bribery: The Role of Wage Incentives." *Economic Journal*. 103: 119-141.

Bliss, C. and Di Tella, R. 1997. "Does Competition Kill Corruption?" *Journal of Political Economy*. 5: 1001-1023.

Cadot, O. 1987. "Corruption as a Gamble." *Journal of Public Economics*. 33: 223-244.

Chong, A. and Calderón, C. 1999a. "Institutional Quality and Income Distribution." *Economic Development and Cultural Change*. Forthcoming.

----. 1999b. "Institutional Quality and Poverty Measures in a Cross-section of Countries." *Economics of Governance*. Forthcoming.

De Long, B. and Shleifer, A. 1993. "Princes and Merchants." *Journal of Law and Economics*. 36 (2): 671-702.

Easterly, W. and Levine, R. 1997. "Africa's Growth Tragedy: Policies and Ethnic Divisions." *Quarterly Journal of Economics*. 62: 1203-1250.

Gaviria, A., Panizza, U., Seddon, J. and Stein, E. 1999. "Political Institutions and Economic Outcomes." Washington, DC, United States: Inter-American Development Bank, Research Department. Mimeographed document.

Greene, W.H. 1997. *Econometric Analysis*. Third Edition. Upper Saddle River, United States: Prentice Hall.

Hall, R. and Jones, C. 1999. "Why Do some Countries Produce So Much More Output per Worker than Others?" *Quarterly Journal of Economics*. 114 (1): 83-116.

Hair, J.F., Anderson, R., Tatham, R. *et al*. 1995. *Multivariate Data Analysis*. Fourth Edition. Upper Saddle River, United States: Prentice Hall.

Henisz, W. 1998. "The Institutional Environment for Economic Growth." Philadelphia, United States: University of Pennsylvania, Wharton School of Business. Mimeographed document.

Inter-American Development Bank. 2000. *Informe sobre el Progreso Económico y Social en América Latina 2000*. Washington, United States: Inter-American Development Bank. D.C.

Jaggers, K. and Gurr, T.R. 1995, "Tracking Democracy's Third Wave with Polity III Data." *Journal of Peace Research*. 32: 469-482.

Jobson, J.D. 1992. *Applied Multivariate Data Analysis. Volume II: Categorical and Multivariate Methods*. New York, United States: Springer.

Kaufmann, D., Kraay, A. and Zoido-Lobatón, P. 1999a. "Aggregating Governance Indicators." Washington, DC, United States: World Bank. Mimeographed document.

----. 1999b. "Governance Matters." Washington, DC, United States: World Bank. Mimeographed document.

Knack, S. and Keefer, P. 1995. "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures." *Economics and Politics*. 7: 207-227.

Laffont, J.J. and N'Guessan, T. 1999. "Competition and Corruption in an Agency Relationship." *Journal of Economic Development*. 60: 271-295.

Laffont, J. J. and Tirole, J. 1998. *A Theory of Incentives in Procurement and Regulation*. Third Printing. Cambridge, United States: MIT Press.

Laffont, J.J. and Meleu, M. 1997. "Reciprocal Supervision, Collusion and Organizational design." *Scandinavian Journal of Economics*. 99 (4): 519-540.

La Porta, R., Lopez-de-Silanes, F. Shleifer, A. *et al*. 1999. "The Quality of Government." *Journal of Law, Economics and Organization*. 15 (1): 222-279.

----. 1998. "Law and Finance." *Journal of Political Economy*. 106: 1113-1155.

Leamer, E. 1983. "Let's Take the Con out of Econometrics." *American Economic Review.* 73 (1): 31-43.

----. 1983. "Sensitivity Analyses Would Help." *American Economic Review.* 75 (3): 308-313.

Leite, C. and Weidmann, J. 1999. "Does Mother Nature Corrupt? Natural Resources, Corruption, and Economic Growth." IMF Working Paper 99/85. Washington, DC, United States: International Monetary Fund.

Levine, R. and Renelt, D. 1992. "A Sensitivity Analysis of Cross-Country Growth Regressions." *American Economic Review.* 82 (4): 942-962.

Ley, E. and Steel, M. 1999. "We Just Averaged over Two Trillion Cross-Country Growth Regressions." IMF Working Paper 99/101. Washington, DC, United States: International Monetary Fund.

Mauro, P. 1995. “Corruption and Growth.” *Quarterly Journal of Economics*. 110 (3): 681-712.

----. 1998. “Corruption and the Composition of Government Expenditure.” *Journal of Public Economics*. 69: 263-279.

McAleer, M., Pagan, A. and Volker, P. 1985. “What Will Take the Con Out of Econometrics?” *American Economic Review*. 75 (3): 293-307.

Moohkerjee, D. and Png, I.P.L. 1995. “Corruptible Law Enforcers: How Should they Be Compensated?” *Economic Journal*. 105: 145-159.

Noorbakhsh, F. 1998. “A Modified Human Development Index.” *World Development*. 26 (3): 517-528.

North, D.C. 1994. “Economic Performance through Time.” *American Economic Review*. 84 (3): 359-368.

----. 1990. *Institutions, Institutional Change, and Economic Performance*. New York, United States: Cambridge University Press.

Olsen, T. and Torsvik, G. 1993. “Collusion and Ratcheting in Hierarchies.” Oslo, Norway: Norwegian Research Center in Organization and Management. Mimeographed document.

Olson, M. 1996. “Big Bills Left on the Sidewalk: Why Some Nations are Rich and Others Poor.” *Journal of Economic Perspectives*. 10: 3-24.

Panizza, U. 1999. “Electoral Rules, Political Systems, and Institutional Quality.” Washington, DC, United States: Inter-American Development Bank, Research Department. Mimeographed document.

----. 1999. “Why Do Lazy People Make More Money? The Strange Case of the Public Sector Wage Premium.” Working Paper 403. Washington, DC, United States: Inter-American Development Bank, Research Department.

Payne, M. and Losada, C. 1999. “Institutions and Development in Latin America: An Attempt to Quantitatively Describe Institutional Capacity in the Region.” Washington, DC, United States: DPP/SCS, Inter-American Development Bank, Sustainable Development Department, State and Civil Society Division. Mimeographed document.

Persson, T. and Tabellini, G. 1998. “The Size and Scope of Government: Comparative Politics with Rational Politicians.” NBER Working Paper 6848. Cambridge, United States: National Bureau of Economic Research.

Rauch, J.E. 1995. “Bureaucracy, Infrastructure, and Economic Growth: Evidence from U.S. Cities during the Progressive Era.” *American Economic Review*. 85: 968-979.

Rauch, J.E. and Evans, P.B. 1999. "Bureaucratic Structure and Bureaucratic Performance in Less Developed Countries." University of California, San Diego Discussion Paper 99-06. San Diego, United States: University of California at San Diego.

Rodrik, D. 1999. "Democracies Pay Higher Wages." *Quarterly Journal of Economics*. 64: 707-738.

Sachs, J. and Warner, A. 1995. "Natural Resources Abundance and Economic Growth." NBER Working Paper 5398. Cambridge, United States: National Bureau of Economic Research.

Sala-i-Martin, X. 1997. "I Just Ran Four Million Regressions." NBER Working Paper 6252. Cambridge, United States: National Bureau of Economic Research.

Sharma, S. 1996. *Applied Multivariate Techniques*. New York, United States: John Wiley and Sons.

Shleifer, A. and Vishny, R. 1993. "Corruption." *Quarterly Journal of Economics*. 108: 599-617.

Stiglitz, J.E. 1999. "The World Bank at the Millennium." *Economic Journal*. 109: 577-597.

Tirole, J. 1996. "A Theory of Collective Reputations (with Applications to the Persistence of Corruption and to Firm Quality)." *Review of Economic Studies*. 63: 1-22.

Treisman, D. 1998. "The Causes of Corruption: A Cross-National Study." Los Angeles, United States: University of California at Los Angeles. Mimeographed document.

Van Rijckeghem, C. and Weder, B. 1997. "Corruption and the Rate of Temptation: Do Low Wages in the Civil Service Cause Corruption?" IMF Working Paper 97/73. Washington, DC, United States: International Monetary Fund.

Wei, S-J. 1997. "How Taxing is Corruption on International Investors?" NBER Working Paper 6030. Cambridge, United States: National Bureau of Economic Research.

Weingast, B.R. 1995. "The Economic Role of Political Institutions: Market-Preserving Federalism and Economic Development." *Journal of Law, Economics and Organization*. 7 (1): 1-31.

World Bank. 1998. *Beyond the Washington Consensus: Institutions Matter*. S.J. Borki and G. Perry, editors. Washington, DC, United States: World Bank.

World Economic Forum. *1999 Global Competitiveness Report*. Davos, Switzerland: World Economic Forum.