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## Institutional quality and government efficiency

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## **INSTITUTIONAL QUALITY AND GOVERNMENT EFFICIENCY**

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## Abstract\*

Poorer countries have a much smaller public sector and correspondingly a smaller tax burden than richer countries, yet, their economic performance has not been necessarily better. Using a simple model, this paper suggests that the growth and welfare effects of taxation are mediated through institutional quality; consequently, optimal tax levels increase with improved institutional quality. The paper then employs firm-level perceptions on the quality of public services and on the tax burden to test some of the model's predictions. Consistent with these predictions, the paper finds that a higher level of institutional quality bolsters positive perceptions of the quality of public services while at the same time moderating the view of taxes as an obstacle to growth.

**Keywords:** Institutions, Taxes, Quality of Public Services.

**JEL Classification Codes:** H20, H41, O10, O17.

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## 1. Introduction

High taxation and a large public sector can potentially distort choices (Meltzer and Richard, 1981) and also lead to corruption and rent seeking, thus impeding economic growth.<sup>1</sup> Yet, despite the overall lighter tax burden in developing countries, there has been remarkably little, if at all, convergence in incomes with the developed world and scarce evidence that growth in the latter has been impeded by a large public sector.<sup>2</sup> In fact, one of the most striking differences between the economies in advanced countries and in developing countries is in the role of the public sector, the former typically having a relatively large public sector, with a substantial commitment to public health, public education, infrastructure, and social security, whereas in developing countries these programs either do not exist or do not entail broad population coverage.<sup>3</sup> Consequently, the tax burden is substantially greater in developed than in developing countries.<sup>4</sup>

One of this paper's goals is to reconcile these observations. Using a simple model, the paper argues that the state's law-enforcement enforcing capacity is crucial to understanding the size and the quality of the public sector and its effect on growth. Where the enforcement quality is high, taxation to finance public spending is much less detrimental for growth than with weak enforcement, so that growth-maximizing tax rates are higher. In a sense, better enforcement quality makes taxation more affordable. Adding the aspect of law enforcement to a relatively standard framework helps explain some of the empirical regularities related to the public sector's efficiency.

We then test some of the implications of the theoretical framework. The focus of our empirical analysis constitutes firm-level perceptions of the quality of public services in general

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<sup>1</sup> For example, Fisman and Wei (2004), and Olken (2006), document how taxation gives rise to corruption in China and in Indonesia, respectively; Reinikka and Svensson (2004) illustrate how public spending on education has been largely wasted because of corruption in Uganda.

<sup>2</sup> See Lindert (2004) for historical analysis and Easterly and Rebelo (1993) for contemporary evidence.

<sup>3</sup> For example, the average for central government spending as a share of the GDP between the years 1996-2000 was almost 40 percent in the high-income group of countries and less than 15 percent in the low-income group of countries (authors' calculations based on various years of the *World Bank Development Report*).

<sup>4</sup> Thus, the share of the GDP collected in tax revenues in recent years was about 30 percent in high-income countries, but only some 10 percent in low-income countries for which data are available. A strong robust relationship between the GDP and tax revenues across countries can be easily discerned from glancing at the data of some high-income countries such as Belgium, Italy, and the Netherlands, where almost 50 percent of GDP is collected in tax revenues, whereas many low-income countries collect 10 percent or even less (*World Development Report*, recent years).

and in specific areas such as infrastructure, health, and education, and on the severity of the tax burden. The responses suggest that, consistent with the model's implications, a better institutional quality reinforces the perceived efficiency of public sector and lowers the perception of the tax burden as an obstacle to firms' business activity.

This paper is related to several literatures. One is the relatively small but evolving literature on the determinants and the growth effects of informality. The significance of informality for capitalistic development is well articulated in De Soto (2000).<sup>5</sup> Other related work emphasizes the role of public investment in development. Barro (1990), for instance, is a seminal contribution in this regard, although its model does not consider the informal sector. Finally, there is work on the determinants of the size and the capacity of the public sector. In regard to the former, Wagner's law suggests that the elasticity of the size of the public sector with respect to output exceeds one, and some more recent literature focuses on the political economy aspects of these determinants.<sup>6</sup> The literature on the effective capacity of the public sector is much more limited. In fact, La Porta et al. (1999), is the only contribution we are aware of in this regard, and we will comment on this paper in greater detail below; our paper can be viewed as complementary to La Porta et al. (1999) in providing additional evidence on the determinants of government quality.

The rest of the paper proceeds as follows. Section 2 presents the basic framework, followed by an equilibrium analysis, in Section 3. Section 4 contains the empirical analysis of some of the theoretical implications, and Section 5 concludes with brief remarks.

## **2. Basic Framework**

The illustrative framework is relatively standard and may be considered a variation on the influential model in Meltzer and Richard (1981). Consider an economy populated by a measure one of non-overlapping households indexed by  $i$ , operating in discrete time  $t$ .<sup>7</sup> Each family

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<sup>5</sup> See also Loayza (1996) and Sarte (2000) for some analytical approaches. Empirical work on this issue includes Schneider and Enste (2000), who provide macroeconomic estimates of informality, Friedman et al. (2000), Johnson et al. (2000), and Dabla-Norris et al. (2007); in particular, the latter papers provide evidence that enforcement quality is a more important determinant of informality than fiscal policies.

<sup>6</sup> See, for example, Alesina et al. (1999), Milesi-Ferreti et al. (2002), and Boix (2001) for a more systematic literature review; the latter paper also contains a thorough literature review.

<sup>7</sup> The assumption of non-overlapping generations is a considerable simplification that enables us to break the intergenerational link in decision making; without this assumption, deriving analytic solutions for collective decisions can be very difficult.

consists of a parent and child, and the parents make the decisions.<sup>8</sup> The initial level of household  $i$ 's income is exogenously given at  $y_{i0}$ , and the income level in period  $t$ ,  $y_{it}$ , is endogenously determined.

Individuals receive parental investment,  $b_{it-1}$ , which is subject to a statutory tax at the rate of  $T_t$ . Individuals can, however, evade paying their taxes by hiding their endowment or by moving their activity into the informal sector. Thus, we assume that a declared part of the parental bequest,  $1 - h_{it}$ , is taxed at the rate of  $T_t$ , and the proceeds are used to provide the public good. The complementary part,  $h_{it}$ , is hidden from the tax authority and shifted to the informal sector. In case of an audit, however, the individual is subject to a penalty. It is assumed that the penalty results in a net loss. This is presumably because of the outlays to cover the costs of monitoring and auditing, which increase the probability of detection of informal activities. Also, incorporating explicitly this latter probability would not alter the results in any manner. These aspects are not explicitly modeled here, as our focus is on the implications of this interaction between the state and the individuals rather than its microeconomic foundations.

Without specifying the details of the auditing procedure we let  $P(h_{it}; \phi_t) = \phi_t h_{it}^2 / 2$  denote the penalty (as a fraction of investment) imposed on an individual hiding  $h_{it}$ , where  $\phi_t \geq 0$  is interpreted as the enforcement quality.<sup>9</sup> The seminal paper Allingham and Sandmo (1972) and subsequent work provide useful framework for microeconomic analyses of tax evasion and auditing; this literature enable an endogenous derivation of the penalty and the evasion activity. As our interest here is less with these aspects and more with their macroeconomic implications, a reduced-form specification as above is adopted. The aggregate share of hidden resources is interpreted as the relative size of the informal sector.

In each period, households' income is allocated between consumption and investment.<sup>10</sup> Normalizing the prices to unity, we therefore write the budget constraint as follows:

$$y_{it} = c_{it} + b_{it} \quad (1)$$

Our assumptions imply that the share of disposable bequests is

$$s_{it} = (1 - T_t)(1 - h_{it}) + h_{it} - \phi_t h_{it}^2 / 2 = 1 - T_t + T_t h_{it} - \phi_t h_{it}^2 / 2 \quad (2)$$

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<sup>8</sup> Note that population size is constant over time; the adopted normalization also conveniently implies that aggregate economy-wide indicators will be identical to the average ones.

<sup>9</sup> The particular quadratic formulation is mainly for tractability purposes.

<sup>10</sup> In a previous version, costs of improving enforcement quality were considered, but the results remained basically unchanged.

Total income is a function of disposable parental bequests, which constitute net private investment, and of the amount of the publicly provided good,  $G_t$ . Assuming a linear production technology, for simplicity we obtain:

$$y_{it} = A(s_{it} b_{it-1} + \beta G_t) = A[(1 - T_t + T_t h_{it} - \phi_t h_{it}^2/2)b_{it-1} + \beta G_t] \quad (3)$$

where  $A > 1$ , and  $\beta$  is the marginal productivity of the public good, relative to that of the bequests; and we assume  $\beta > 1/2$  to guarantee an internal solution. This formulation, in particular, allows for public investment to be more or less productive than private investment. This is in line with the empirical literature, which comes up with ambiguous results in this regard. While an early paper Aschauer (1989) suggests that public investment may be more productive, later work such as Gramlich (1994) qualifies this conclusion, see Gramlich, 1994. Incorporation of the public good into a growth framework follows the seminal work of Barro (1990). It will additionally be assumed that the public good fully depreciates at the period's end and that the government budget is balanced in each period.

This good is financed by taxes, so that with balanced budget in each period its amount is

$$G_t = T_t \int b_{jt-1} (1 - h_{jt}) dj \quad (4)$$

Parental utility is derived from current family consumption and from the investment bequest left to one's offspring. For tractability we specify the utility as follows:

$$u(c_{it}, b_{it}) = c_{it}^{1-\alpha} b_{it}^{\alpha}, \quad 0 < \alpha < 1 \quad (5)$$

In each period, given the level of enforcement and the tax rate, individuals allocate their income between consumption and investment and determine the fraction of unreported income.

### 3. Analysis

Given the policy parameters and family income, the utility (5) maximizing income allocation is

$$c_{it} = (1-\alpha)y_{it}, \quad b_{it} = \alpha y_{it}$$

substitution of which back into the utility function yields



$$u_{it} = y_{it} = A[(1 - T_t + T_t h_{it} - \phi_t h_{it}^2/2) b_{it-1} + \beta G_t] \quad (6)$$

Maximizing with respect to the share of hidden income, we obtain

$$h_t = h_{it} = \text{Min} \{1, T_t/\phi_t\} \quad (7)$$

so that informality is an increasing function of the tax rate, more so when enforcement quality is lax, and a decreasing function of enforcement quality. Substitutions then yield

$$s_t = s_{it} = \text{Max} \{1 - \phi_t/2, 1 - T_t + T_t^2/2\phi_t\} \quad (8)$$

Recalling the definition of a public good and assuming for simplicity that  $T_t < \phi_t$ , so that individuals hide just a part of their effort, further substitutions yield

$$G_t = B_{t-1} T_t (1 - T_t/\phi_t) \quad (9)$$

where  $B_{t-1}$  is the aggregate bequest.

Differentiation reveals that the relationship between the tax rate and the amount of the public good is non-monotonic, increasing initially, when  $T_t < \phi_t/2$ , and decreasing afterwards. This is not surprising as, when the tax rate is high, individuals react by hiding a larger portion of the bequeathed resources, generating a decreasing portion of the Laffer curve. The public good-maximizing tax rate,  $T_t = \phi_t/2$ , is an increasing function of enforcement quality. Further, differentiation reveals that enforcement quality enhances public good provision.

More generally, we have

**Proposition 1.** The effect of taxation on informality works through enforcement quality and is stronger when the latter is lax. Consequently, the effective amount of the public good is a non-monotonic function of the tax rate, first increasing and then decreasing, and an increasing function of the enforcement quality; also, better enforcement quality implies a higher tax rate that maximizes the effective amount of the public good.

This result has direct implications for the effect of policy variables on the economy's average income growth. Recall that income and utility are determined by

$$u_{it} = y_{it} = A(s_{it} b_{it-1} + \beta G_t) = A[(1 - T_t + T_t^2/2\phi_t) \alpha y_{it-1} + \beta \alpha Y_{t-1} T_t (1 - T_t/\phi_t)] \quad (10)$$

Analysis of (10) reveals that income inequality is a decreasing function of both the tax rate and the enforcement quality.<sup>11</sup>

Aggregating over the entire population, the aggregate utility and average income are

$$U_t = Y_t = A[(1 - T_t + T_t^2/2\phi_t)\alpha Y_{t-1} + \beta\alpha Y_{t-1}T_t(1 - T_t/\phi_t)] \quad (11)$$

and the economy's growth rate, therefore, is

$$g_t = Y_t/Y_{t-1} - 1 = A[(1 - T_t + T_t^2/2\phi_t)\alpha + \beta\alpha T_t(1 - T_t/\phi_t)] - 1 \quad (12)$$

Differentiation reveals that, with our assumption on  $\beta$ , it is maximized for

$$T_t = \phi_t(\beta-1)/(2\beta-1) \quad (13)$$

which, again, is an increasing function of the enforcement quality; and comparison with the tax rate maximizing the level of the public good,  $T_t = \phi_t/2$ , reveals that growth maximization requires a smaller tax rate. This is because taxes lower the disposable level of bequests, in addition to their effect on the public good. Also note that, as seen by differentiating (12), the level of enforcement has a positive effect on growth, because the positive effect on the provision of the public good outweighs the negative effect of reducing net private investment. Further, since aggregate utility is equivalent to aggregate income, the same tax rate also maximizes welfare.

Differentiation of (10) and assuming an internal solution yields individual  $i$ 's preferred tax rate:

$$(-1 + T_t/\phi_t)y_{it-1} + \beta(1 - 2T_t/\phi_t)Y_{t-1} = 0 \quad (14)$$

and total differentiation of (14) reveals that for all individuals with  $y_{it-1} < 2\beta Y_{t-1}$ —hence, recalling that  $\beta > 1/2$ , for a majority of the population—the preferred tax rate increases with the level of institutional quality.

Collecting the results, we obtain

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<sup>11</sup> Let  $j$  and  $k$  be two individuals, with  $y_{jt-1} > y_{kt-1}$ ; then the income gap between their respective descendants,  $y_{jt} - y_{kt} = A(1 - T_t + T_t^2/2\phi_t)\alpha(y_{jt-1} - y_{kt-1})$ , decreases in  $T_t$  and in  $\phi_t$ . Since this holds true for any pair of individuals, higher taxes and enforcement decrease inequality. Note, however, that as long as the tax rate and the level of enforcement quality are positive income inequality decreases over time; otherwise, it remains constant.

**Proposition 2.** Income inequality decreases in the tax rate and in the quality of enforcement; the growth and welfare-maximizing tax rate in each period increases in the level of the enforcement quality; and the preferred tax rate increases in the quality of enforcement for population majority.

Our theoretical analysis generates several implications. One implication, that taxation affects informality through the intermediation of institutional quality, seems to be highly consistent with recent findings. While early work found that tax burden and government regulations lead to a larger informal sector (see Schneider and Enste, 2000), more recent research suggests that when institutional variables are included in the regression specification they trump the tax and regulation variables (Chong and Gradstein, 2007). Further, using firm-level data, Friedman et al. (2000) and Johnson et al. (2000) in their analysis of transition economies find that firms' trust in the rule of law explains their tendency to go informal much better than measures of the tax burden.

Using firm-level data, Dabla-Norris et al. (2007) find that, while both taxes and regulations tend to be associated with higher levels of informality, the rule of law emerges as its dominant predictor. Regression analysis indicates that the adverse effect of taxes in this regard is moderated by a high level of the rule of law as perceived by firms, which is again consistent with our analytical findings; it also indicates that stronger rule of law is associated with more efficient government, which in turn also decreases the propensity to go informal.

Therefore we focus here on a different implication of the theoretical framework, namely, that a better institutional environment is associated with a better-functioning public sector. Some preliminary insights here may be derived from La Porta et al. (1999), which exhibits highly significant correlations across countries between measures of institutional quality such as the political rights index on one hand and measures of the size of the public sector (the fraction of the labor force employed in the public sector) and its outcomes (such as in health, education, and infrastructure) on the other hand.<sup>12</sup> Their cross-country regressions also reveal that institutional proxies are associated with the size of the public sector.

While these findings provide valuable insights generally consistent with the model's predictions, it is important to enhance them with more disaggregated evidence whereby country fixed effects would be minimized. The dataset generated through the World Business

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<sup>12</sup> For example, the correlation of the political rights index with the infant mortality variable is -0.57; with school attainment -0.67; and with the infrastructure index -0.68.

Environment Survey (WBES) by the World Bank allows us to provide such evidence. We now proceed to describe this dataset.

## **4. Empirical Evidence**

### ***4.1. Data and Empirical Strategy***

The survey was taken as an initiative of the World Bank Group, in partnership with many other institutions seeking to obtain feedback from enterprises on the state of the private sector in client countries; to measure the quality of governance and public services, including the extent of corruption; to provide better information on constraints to private sector growth, from the enterprise perspective; to establish the basis for internationally comparable indicators which can track changes in the business environment over time, thus allowing both for competitive assessment and impact assessments of market-oriented reforms; and to stimulate systematic public-private dialogue on business perceptions and the agenda for reform. The field work was carried out between 1999 and 2000 by private polling of a representative sample of firms in each country that met requirements for inclusion based on sector, size, location, and ownership characteristics.<sup>13</sup> The objective was to gather information on a sizeable number of firms in several countries around the world, which was accomplished for most of the sample.<sup>14</sup> The sample consists of firm-level survey responses of thousands of firms in more than 80 countries, many of them developing and in transition. The survey asked each business to rank the constraints or problems impacting on their operations. This process involved an extensive questionnaire undertaken via a face-to-face interview with either the firm managers or firm owners of each company. As a result, the survey reports comparative measurements based on

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<sup>13</sup> The particular requirements that had to be filled by the sample selected were as follows. Sector: In each country, the sectoral composition in terms of Manufacturing (including agro-processing) versus Services (including commerce) will be determined by relative contribution to GDP, subject to a 15 percent minimum for each category. Size: At least 15 percent of the sample shall be in the small and 15 percent in the large size categories. Ownership: At least 15 percent of the firms will have foreign control. Exporters: At least 15 percent of firms will be exporters, meaning that some significant share of their output is exported. Location: At least 15 percent of firms will be in the category “small city or countryside.”

<sup>14</sup> The countries and number of firms (in parenthesis) included in the survey are: Argentina (76), Bangladesh (38), Belarus (101), Bolivia (72), Brazil (148), Bulgaria (84), Canada (87), Chile (80), Colombia (88), Costa Rica (51), Czech Republic (81), Dominican Republic (68), Ecuador (52), El Salvador (63), France (72), Germany (75), Guatemala (51), Haiti (71), Honduras (50), Hungary (102), India (123), Indonesia (70), Italy (67), Malaysia (43), Mexico (43), Nicaragua (62), Pakistan (72), Panama (49), Peru (77), Philippines (90), Poland (175), Portugal (78), Romania (114), Slovakia (23), Spain (82), Sweden (76), Thailand (71), Turkey (113), United Kingdom (59), United States (86), Ukraine (158), and Uruguay (57).

firms' perceptions about their business environment as shaped by a variety of economic and policy factors.

Crucially for testing the model's implications, we use as proxies of the supply of public goods respondents' answers to questions on the quality of public services such as infrastructure, health and education, and security, and the efficiency of the government in delivering those services. A typical question is as follows: "How would you generally rate the efficiency of central and local government in delivering services?" with responses ranging from "1=very inefficient" to "6=very efficient." Also, we use as proxies of the institutional quality questions related to the firm's perception of the quality of the judicial system and its functioning, as well as the main institutional constraints on firm growth, such as policy instability and corruption. Finally, responses to questions on obstacles to firm growth posed by taxes and their regulation are taken as proxies of the tax burden.

We additionally include country-wide variables, in particular, institutional quality and the tax rate. The former is taken from International Country Risk Guide (2006), a well-known comprehensive index including the assessment of corruption within the political system, the strength and impartiality of the judicial system, the assessment of the popular observance of laws, and the institutional strength and quality of the bureaucracy. This index is taken as an average for the period 1998-2002 in order to assess the long-term quality of the institutional framework. As for the tax rate, we use the VAT rate as of August 2004, which is taken from the International Monetary Fund (2006). Finally, as controls, we base our specification on existing literature and, in particular, include firm characteristics, such as ownership, size, and industrial sector. Table 1 provides detailed definitions of all the variables used in this paper and Table 2 provides corresponding summary statistics, whereas the Appendix exhibits the correlation matrix along with corresponding statistical significance.

## ***4.2. Specification and Results***

Our analysis concentrates on testing the implications of the theoretical model above, particularly Proposition 1.<sup>15</sup> Table 3 presents our benchmark specification for the determinants of the efficiency of the government in delivering public services. As our dependent variable is categorical, we run ordered probit regressions and show the coefficients obtained.<sup>16</sup>

We find that, on average, government-owned firms perceive the government as relatively efficient in delivering public services. Also, the size of the firm is positively linked to the perception of government efficiency. In contrast, we do not find any significant relationship between a firm's sector and views of government efficiency.

Consistent with the predictions of the model, and similar to previous country-level evidence (La Porta et al., 1999), we find a significant association between the quality of institutions and efficiency in the provision of public services at the firm level. Furthermore, in order to exploit the between and within-country variation that our data allow, we include both country-level and firm-level variables that takes into account the quality of institutions. As described above, at the domestic level we use the institutional quality index from ICRG (2006). At the firm level we use answers to questions involving institutional constraints on growth, particularly questions relating to policy instability, corruption, and the overall assessment of the quality of the judiciary. The evidence presented in Table 3 shows that there is a highly significant association between the quality of institutions and the efficiency of the government in providing public services. Particularly, the more stable and predictable the policy environment, the less corrupt and the more reliable the judiciary is perceived to be, and the more efficient government is in delivering public services.

Table 4 shows the marginal coefficients of our variables of interest based on our benchmark regression on the first column of Table 3. These results are consistent with those describe above. For instance, an increase in one standard deviation in the quality of institutions index—equivalent to moving from the institutional quality level of Mexico (7.8) to that of Spain (11.7)—is associated with a 0.3 percent increase in the probability of ranking the performance of the government as “very efficient.” Similarly, at the firm level, a move from a response that

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<sup>15</sup> La Porta et al. (1999) have somewhat similar tests to our Proposition 1 but at the country level.

<sup>16</sup> One must bear in mind that while the coefficients obtained from ordered probits cannot be interpreted directly, as we need to calculate marginal coefficients, the significance and sign of such coefficients can be interpreted. For

policy instability poses a “minor obstacle to growth” to “no obstacle at all” is associated with an increase of about 0.7 percent in the probability of ranking the government as “very effective.”

Further, in Table 5 we present evidence on firms’ perception of tax rates and regulation as obstacles to growth as determined by firm characteristics, overall institutional quality, current tax rates, and the quality of public goods provided by the government. As expected, higher tax rates, measured by the value added tax (VAT) rate, are positively related to the perception of taxes as an obstacle for growth, but the institutional quality index and the quality of public services are negatively associated with this perception.<sup>17</sup>

### **4.3. Robustness**

Table 6 presents further evidence on the impact of institutional quality on the quality of services by using other variables that capture the quality of delivery of public goods, particularly education, public health, water service, electric power, the postal system, and the overall quality of public works, focusing on the coefficients of the variables of interest. We find that there is a robust, positive, and statistically significant link between the measures of institutional quality and the quality of the various services provided by the government, as well as its efficiency.

Since our model emphasizes the legal enforcement aspect of institutional quality, in Table 7 we further focus on law enforcement as a determinant of government efficiency. The survey’s detailed coverage of firms’ perceptions of the legal system allows for analysis of various features of the system, including but not limited to its speed, fairness and impartiality, and enforceability; as can be seen, each of these is positively related to perception of the government as an effective provider of services. As the country-level institutional proxy remains highly significant and with a positive effect, so does our measures of the efficiency of the courts. Furthermore, the robustness of the results is not only confirmed by the effects of other institutional proxies but also by other indices of the quality of the public services.

A possible shortcoming of our findings is the potential bias generated by problems such as endogeneity or reverse causality between the government’s efficiency in delivering services and institutional quality. For instance, governments that provide high-quality public services can also have good institutions. We employ instrumental variables to alleviate this concern. In

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space considerations, we provide marginal coefficients for benchmark results, only, see Tables 4. We would be happy to provide the additional marginal calculations upon request.

<sup>17</sup> A table with the corresponding marginal coefficients may be provided upon request.

particular, we use a two-stage procedure with legal origin as our instrument, as has been shown in the literature (e.g., La Porta et al., 1998 and 1999), that the origin of the legal system of a country is a very strong determinant of its current institutional quality. Also, it is reasonable to believe that the legal origin of a country may be minimally related to the efficiency of the government in the delivery of public services as, unlike the overall quality of the institutions of a country, it is more likely that efficiency in the delivery of services may be determined by short-run conditions rather than those that created the legal framework of the country some time ago (La Porta et al., 1999). Notice that since the institutional quality index is a continuous variable, and the firm-level assessment of the institutions is a categorical one, we must adopt somewhat different methodological procedures for each case. We instrument the institutional variables at the country and firm level using legal origin dummies as instruments in the first-stage regressions. For country-level institutional quality, we first run an ordinary least squares specification; for the case of the firm level institutional variables, we run ordered probit regressions, obtaining the predicted probabilities for each value of the endogenous variable, which are included as regressors in the second-stage regression (we omit the lowest category, which stands as the base). The corresponding marginal coefficients are shown in Table 8.<sup>18</sup> Overall, we observe that the effect of institutions tends to increase significantly. For instance, an increase of one standard deviation in the quality of institutions index is associated with an increase of 1.2 percent in the probability of ranking the efficiency of the government as “very efficient.” For the case of firm-level institutional variables, the corresponding probabilities also increase once we control for endogeneity.

## 5. Conclusions

This paper’s starting point is the observation that neither the size of government nor the tax burden seems in itself to impede economic performance in a cross-section of countries. It then provides a theoretical model whereby the growth effect of taxes is mediated through the law-enforcing ability of the state. The results then indicate that the growth-promoting and welfare-maximizing tax rate, hence the size of the public sector, increases with the enforcement ability.

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<sup>18</sup> We also instrumented the other regressions shown in Table 3 obtaining similar results. For space reasons we do not present these results, but we will be happy to provide them upon request.



We then test these results using firm-level data that contain information about satisfaction with public services and the extent to which taxation is viewed as an obstacle to growth. It turns out that institutional quality affects both: the better public services are perceived to be, the less detrimental is taxation. All this lends support to the analytically derived and commonly observed cross-country positive association between institutional quality and government involvement.

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**Table 1. Variable Definitions**

Variables	Definition	Source
<i>Firm characteristics</i>		
Company is owned by a foreign investor	Answer to the question on the nationality of the owners. The variable takes the value of 1 if the company is owned by a foreign investor, and zero otherwise.	
Government owns the company	Answer to the question on the ownership of the firm. The variable takes the value of 1 if the company is owned by the government, and zero otherwise.	
Size: Medium	A firm is defined as medium size if it has between 51 and 500 employees.	WBES
Size: Large	A firm is defined large size if it has more than 500 employees.	
Manufacturing	Firm belongs to the manufacturing sector.	
Service	Firm belongs to the service sector.	
Agriculture	Firm belongs to the agriculture sector.	
Construction	Firm belongs to the construction sector.	
<i>Firm's perception of institutional quality</i>		
General constraint-political instability	Answer to the question: Please judge on a four point scale how problematic are the following factors for the operation and growth of your business: Policy instability/uncertainty. (1) Major obstacle; (2) Moderate obstacle; (3) Minor obstacle; (4) No Obstacle.	
General constraint-corruption	Answer to the question: Please judge on a four point scale how problematic are the following factors for the operation and growth of your business: Corruption. (1) Major obstacle; (2) Moderate obstacle; (3) Minor obstacle; (4) No Obstacle.	
Confidence in judicial system	Answer to the statement: "I am confident that the legal system will uphold my contract and property rights in business disputes". The answer ranges from 1 to 6, where 1=fully disagree, and 6=fully agree.	
Courts-enforceability	Answer to the question: In resolving business disputes, do you believe your country's court system to be: Decisions Enforced. The answer ranges from 1 to 6, where, 1=never, and 6=always.	
Courts-consistent	Answer to the question: In resolving business disputes, do you believe your country's court system to be: Consistent. The answer ranges from 1 to 6, where, 1=never, and 6=always.	WBES
Courts-affordable	Answer to the question: In resolving business disputes, do you believe your country's court system to be: Affordable. The answer ranges from 1 to 6, where, 1=never, and 6=always.	
Courts-quick	Answer to the question: In resolving business disputes, do you believe your country's court system to be: Quick. The answer ranges from 1 to 6, where, 1=never, and 6=always.	
Courts-honest	Answer to the question: In resolving business disputes, do you believe your country's court system to be: Honest/Uncorrupt. The answer ranges from 1 to 6, where, 1=never, and 6=always.	
Courts--fair & impartial	Answer to the question: In resolving business disputes, do you believe your country's court system to be: Fair and Impartial. The answer ranges from 1 to 6, where, 1=never, and 6=always.	

**Table 1. Variable Definitions (continued)**

<i>Firm's Perception about Quality of public services</i>		
Efficiency of government in delivering services	Answer to the question: How would you generally rate the efficiency of central and local government in delivering services? The answer ranges from 1 to 6, where, 1=very inefficient, and 6=very efficient.	
Quality of education	Rating of the overall quality and efficiency of services delivered by the following public agencies or services: Education services/Schools. Answer ranges from 1=Very bad, to 6=Very good.	
Quality of public health	Rating of the overall quality and efficiency of services delivered by the following public agencies or services: Public Health Care Service/Hospitals. Answer ranges from 1=Very bad, to 6=Very good.	
Quality of water	Rating of the overall quality and efficiency of services delivered by the following public agencies or services: The Water/Sewerage Service/Agency. Answer ranges from 1=Very bad, to 6=Very good.	WBES
Quality of power	Rating of the overall quality and efficiency of services delivered by the following public agencies or services: The Electric Power Company/Agency. Answer ranges from 1=Very bad, to 6=Very good.	
Quality of telephones	Rating of the overall quality and efficiency of services delivered by the following public agencies or services: The Telephone Service/Agency. Answer ranges from 1=Very bad, to 6=Very good.	
Quality of public works	Rating of the overall quality and efficiency of services delivered by the following public agencies or services: Roads Department/Public Works. Answer ranges from 1=Very bad, to 6=Very good.	
<i>Country- level institutional quality</i>		
Quality of Institutions index	Average of the index in the period 1998-2002. The aggregated index comprises: (a) Corruption - Assessment of the corruption within the political system. The most common form of corruption met directly by business is financial corruption in the form of demands for special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans. It is also more concerned with actual or potential corruption in the form of excessive patronage, nepotism, job reservations, "favor-for-favors," secret party funding, and suspiciously close ties between politics and business, (b) Law and Order - Law and Order are assessed separately, with each sub-component comprising zero to three points. The Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of popular observance of the law. A country can enjoy a high rating - 3 - in terms of its judicial system, but a low rating - 1 - if it suffers from a very high crime rate of if the law is routinely ignored without effective sanction (for example, widespread illegal strikes), and (c) Bureaucratic Quality - The institutional strength and quality of the bureaucracy is another shock absorber that tends to minimize revisions of policy when governments change. High points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. Countries that lack the cushioning effect of a strong bureaucracy receive low points because a change in government tends to be traumatic in terms of policy formulation and day-to-day administrative functions. The index takes values between 0 and 18.	ICRG
<i>Taxes</i>		
General constraint-taxes and regulations	Answer to the question: Please judge on a four point scale how problematic are the following factors for the operation and growth of your business: Policy instability/uncertainty. (1) Major obstacle; (2) Moderate obstacle; (3) Minor obstacle; (4) No Obstacle.	WBES
Current VAT rate	Data correspond to the current standard VAT rate as of August 2004. The information was comprised by the IMF "VAT Database: VAT Rates for Fund Member Countries", which in turn was based on calculations by the International Bureau of Fiscal Documentation; and Corporate Taxes 2003-2004, Worldwide Summaries (PricewaterhouseCoopers).	IMF

**Table 2. Summary Statistics**

Variables	Obs	Mean	Std. Dev.	Min	Max
<i>Firm characteristics</i>					
Company is owned by a foreign investor	9673	0.19	0.39	0	1
Government owns the company	9645	0.12	0.33	0	1
Size: Medium	10007	0.40	0.49	0	1
Size: Large	10007	0.19	0.39	0	1
Manufacturing	9141	0.36	0.48	0	1
Service	9141	0.43	0.50	0	1
Agriculture	9141	0.07	0.26	0	1
Construction	9141	0.10	0.29	0	1
<i>Firm's perception of institutional quality</i>					
General constraint-political instability	9034	2.21	1.08	1	4
General constraint-corruption	8376	2.47	1.15	1	4
Confidence in judicial system	9539	3.76	1.43	1	6
Courts-enforceability	8902	3.42	1.47	1	6
Courts-consistent	8614	3.13	1.41	1	6
Courts-affordable	8875	3.18	1.46	1	6
Courts-quick	9067	2.35	1.28	1	6
Courts-honest	8814	3.35	1.50	1	6
Courts--fair & impartial	9012	3.44	1.44	1	6
<i>Firm's Perception of Quality of public services</i>					
Efficiency of government in delivering services	7786	3.16	1.20	1	6
Quality of education	8874	3.59	1.27	1	6
Quality of public health	9227	3.23	1.35	1	6
Quality of water	9390	4.00	1.29	1	6
Quality of power	9485	4.11	1.28	1	6
Quality of telephones	9518	4.17	1.24	1	6
Quality of public works	9035	3.35	1.36	1	6
<i>Country- level institutional quality</i>					
Quality of Institutions index	8935	8.55	2.78	0	15.88
<i>Taxes</i>					
General constraint-taxes and regulations	9382	2.86	1.01	1	4
Current VAT rate	9467	16.20	4.63	5	25

**Table 3. Institutional Quality and Public Services (ordered probits)**

	Efficiency of government in delivering services (1=very inefficient 6=very efficient)		
Company is owned by a foreign investor	0.035 (0.71)	0.031 (0.64)	0.003 (0.06)
Government owns the company	0.130 (2.02)**	0.098 (1.43)	0.099 (1.43)
Size: Medium	0.111 (1.90)*	0.081 (1.29)	0.080 (1.31)
Size: Large	0.211 (3.27)***	0.178 (2.59)***	0.120 (1.81)*
Manufacturing	-0.140 (0.59)	-0.133 (0.52)	-0.152 (0.62)
Service	-0.140 (0.59)	-0.157 (0.63)	-0.145 (0.60)
Agriculture	-0.281 (1.13)	-0.325 (1.24)	-0.266 (1.03)
Construction	-0.238 (1.02)	-0.217 (0.87)	-0.238 (0.98)
Quality of Institutions index	0.041 (2.25)**	0.046 (2.19)**	0.041 (2.25)**
General constraint-political instability	0.214 (6.82)***		
General constraint-corruption		0.161 (5.45)***	
Confidence in judicial system			0.276 (11.98)***
Observations	6039	5721	6107
Log pseudo likelihood	-9264.84	-8827.15	-9137.98
Pseudo R-sq	0.03	0.02	0.05
Chi-sq	193.15	122.90	283.10

Robust z-statistics in parentheses. Standard errors clustered at the country level.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 4. Institutional Quality and Public Services:  
Selected Marginal Coefficients for Benchmark Regression**

	Efficiency of government in delivering services (1=very inefficient 6=very efficient)					
	Pr[Y=1   X]	Pr[Y=2   X]	Pr[Y=3   X]	Pr[Y=4   X]	Pr[Y=5   X]	Pr[Y=6   X]
Quality of Institutions index	-0.007 (-2.22)**	-0.007 (-2.24)**	-0.001 (-1.52)	0.008 (2.31)**	0.006 (2.21)**	0.001 (1.68)*
General constraint-political instability	-0.036 (-6.90)***	-0.038 (-6.40)***	-0.008 (-1.94)*	0.042 (6.84)***	0.032 (5.90)***	0.007 (3.02)***

The number of observations is 6039, the Log-likelihood is -9264.84, the Pseudo-R-squared is 0.03, and the corresponding Chi-Squared is 193.15. Robust z-statistics in parentheses. Standard errors clustered at the country level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%



**Table 5. Taxation as an Obstacle (ordered probits)**

	General constraint-taxes and regulations (1=no obstacle 4=major obstacle)						
Quality of Institutions Index	-0.046 (2.27)**	-0.055 (2.73)***	-0.047 (2.35)**	-0.044 (2.12)**	-0.050 (2.41)**	-0.045 (2.34)**	-0.051 (2.54)**
Current VAT rate	0.044 (2.70)***	0.049 (2.82)***	0.044 (2.58)***	0.045 (2.57)**	0.049 (2.93)***	0.044 (2.59)***	0.048 (3.02)***
Quality of education							-0.112 (5.24)***
Quality of public health						-0.102 (4.79)***	
Quality of water					-0.058 (2.56)**		
Quality of power				-0.073 (2.66)***			
Quality of telephones			-0.052 (1.88)*				
Quality of postal system		-0.040 (1.44)					
Quality of public works	-0.099 (4.36)***						
Observations	6436	6803	6782	6760	6733	6604	6349
Num. of countries	70.00	70.00	69.00	69.00	70.00	70.00	70.00
Log pseudolikelihood	-7962.09	-8473.26	-8503.29	-8462.53	-8371.68	-8179.98	-7850.09
Pseudo R-sq	0.05	0.04	0.04	0.04	0.04	0.05	0.05
Chi-sq	274.97	230.69	208.26	198.71	255.95	240.32	259.29

All the regressions also include the same controls as the ones employed in Table 3, namely, whether the company is owned by foreigners or the state, whether the size of the company is large or medium, whether the industry is manufacturing, agriculture, construction, or services, and the country-level institutional index. These variables have been omitted for the sake of economy. Robust z-statistics in parentheses. Standard errors clustered at country level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 6. Institutional Quality and Public Services: Robustness Checks**

	Quality of education	Quality of public health	Quality of water	Quality of power	Quality of telephones	Quality of public works
Quality of Institutions index	0.048 (1.78)*	0.080 (2.83)***	0.101 (6.87)***	0.094 (4.70)***	0.077 (3.63)***	0.050 (3.25)***
Confidence in judicial system	0.175 (9.96)***	0.173 (9.09)***	0.134 (7.44)***	0.151 (7.94)***	0.144 (7.83)***	0.177 (9.17)***
Observations	6786	7055	7169	7206	7222	6887
Pseudo R-sq	0.03	0.04	0.04	0.04	0.04	0.03
Quality of Institutions index	0.049 (1.63)*	0.078 (2.51)**	0.097 (7.13)***	0.091 (4.62)***	0.078 (3.54)***	0.048 (3.08)***
General constraint-corruption	0.128 (4.62)***	0.143 (4.84)***	0.124 (5.57)***	0.121 (4.95)***	0.080 (3.12)***	0.146 (5.54)***
Observations	6214	6451	6562	6577	6591	6316
Pseudo R-sq	0.02	0.03	0.04	0.04	0.03	0.02
Quality of Institutions index	0.047 (1.63)*	0.079 (2.69)***	0.102 (7.32)***	0.094 (4.75)***	0.082 (3.78)***	0.048 (3.06)***
General constraint-political instability	0.154 (6.13)***	0.152 (5.23)***	0.091 (3.39)***	0.095 (3.27)***	0.055 (2.22)**	0.160 (6.13)***
Observations	6442	6689	6817	6842	6861	6536
Pseudo R-sq	0.02	0.03	0.04	0.03	0.03	0.02

Only relevant coefficients are shown. The dependent variables are shown in the first line, and the independent variables, as well as some relevant statistics, are in the first column. Coefficients obtained after estimating models similar to those specified in Table 3. Robust z-statistics in parentheses. Standard errors clustered at the country level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 7. Institutional Quality, Courts, and Public Services (ordered probits)**

	Efficiency of government in delivering services (1=very inefficient 6=very efficient)					
Company is own by a foreign investor	0.013 (0.35)	0.006 (0.15)	0.041 (1.00)	0.024 (0.53)	0.016 (0.42)	0.005 (0.13)
Government owns the company	0.091 (1.40)	0.101 (1.53)	0.051 (0.75)	0.071 (1.00)	0.062 (0.94)	0.085 (1.18)
Size: Medium	0.049 (0.90)	0.044 (0.76)	0.096 (1.92)*	0.062 (1.09)	0.062 (1.19)	0.080 (1.30)
Size: Large	0.123 (1.90)*	0.128 (1.88)*	0.187 (2.87)***	0.139 (1.93)*	0.141 (2.23)**	0.158 (2.19)**
Manufacturing	0.008 (0.03)	0.079 (0.29)	-0.056 (0.25)	-0.053 (0.16)	0.030 (0.10)	-0.047 (0.15)
Service	0.007 (0.03)	0.086 (0.31)	-0.068 (0.30)	-0.055 (0.17)	0.044 (0.15)	-0.055 (0.18)
Agriculture	-0.179 (0.65)	-0.060 (0.21)	-0.310 (1.30)	-0.238 (0.70)	-0.124 (0.41)	-0.199 (0.63)
Construction	-0.100 (0.38)	-0.016 (0.06)	-0.199 (0.88)	-0.176 (0.55)	-0.065 (0.22)	-0.156 (0.52)
Quality of Institutions index	0.044 (2.60)***	0.043 (2.61)***	0.061 (3.77)***	0.073 (3.48)***	0.049 (2.78)***	0.055 (2.90)***
Courts-enforceability						0.154 (6.14)***
Courts-consistent					0.231 (9.39)***	
Courts-affordable				0.127 (5.28)***		
Courts-quick			0.278 (8.95)***			
Courts-honest		0.199 (8.47)***				
Courts--fair & impartial	0.219 (9.13)***					
Observations	5949	5814	5997	5882	5897	5886
Log pseudo likelihood	-8993.35	-8812.59	-8986.95	-9013.67	-8881.37	-8987.56
Pseudo R-sq	0.04	0.04	0.05	0.03	0.04	0.03
Chi-sq	197.91	181.63	183.61	124.70	200.54	148.58

Robust z-statistics in parentheses. Standard errors clustered at the country level.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 8. Institutional Quality and Public Services: Ordered probits with Instrumental Variables, Selected Marginal Coefficients for the Benchmark Regression**

	Efficiency of government in delivering services (1=very inefficient 6=very efficient)					
	Pr[Y=1   X]	Pr[Y=2   X]	Pr[Y=3   X]	Pr[Y=4   X]	Pr[Y=5   X]	Pr[Y=6   X]
Quality of Institutions index	-0.025 (-2.57)**	-0.026 (-2.30)**	-0.004 (-1.31)	0.030 (2.41)**	0.021 (2.27)**	0.004 (2.23)**
Pr(General constraint-political instability==2)	-0.856 (-3.20)***	-0.886 (-2.89)***	-0.143 (-1.56)	1.028 (2.96)***	0.731 (2.99)***	0.126 (3.11)***
Pr(General constraint-political instability==3)	0.372 (1.30)	0.385 (1.31)	0.062 (1.38)	-0.447 (-1.29)	-0.318 (-1.37)	-0.055 (-1.45)
Pr(General constraint-political instability==4)	-2.558 (-3.40)***	-2.647 (-3.13)***	-0.427 (-1.63)*	3.073 (3.17)***	2.184 (3.26)***	0.376 (3.43)***

The number of observations is 5940, the Log-likelihood is -9029.25, the Pseudo-R-squared is 0.02, and the corresponding Chi-Squared is 199.68. We instrument the institutional variables at the country and firm level using legal origin dummies as instruments in the first stage regressions. For the country level institutional quality, we first run an ordinary least squares specification; for the case of the firm level institutional variables, we run ordered probit regressions, obtaining the predicted probabilities for each value of the endogenous variable, which are included as regressors in the second stage regression (we omit the lowest category, which stands as the base). Robust z-statistics in parentheses. Standard errors clustered at the country level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

## Appendix: Correlation Matrix

(p-values shown below correlation coefficients)

	Company is own by a foreign investor	Government owns the company	Size: Medium	Size: Large	Manufacturing	Service	Agriculture	Construction	General constraint- political instability	General constraint- corruption	Confidence in judicial system	Efficiency of government in delivering services	Quality of Institutions index	General constraint- taxes and regulations
Government owns the company	-0.056													
	0.000													
Size: Medium	0.039	0.150												
	0.000	0.000												
Size: Large	0.207	0.117	-0.401											
	0.000	0.000	0.000											
Manufacturing	0.115	0.036	0.057	0.144										
	0.000	0.001	0.000	0.000										
Service	-0.060	-0.047	-0.102	-0.103	-0.659									
	0.000	0.000	0.000	0.000	0.000									
Agriculture	-0.077	0.049	0.098	-0.012	-0.208	-0.240								
	0.000	0.000	0.000	0.268	0.000	0.000								
Construction	-0.035	-0.038	0.003	-0.049	-0.245	-0.283	-0.089							
	0.001	0.000	0.767	0.000	0.000	0.000	0.000							
General constraint-political instability	0.056	0.038	-0.032	0.042	-0.005	0.022	-0.063	0.005						
	0.000	0.000	0.002	0.000	0.627	0.048	0.000	0.651						
General constraint-corruption	0.030	0.088	0.019	0.030	-0.009	0.070	-0.014	-0.055	0.414					
	0.006	0.000	0.082	0.006	0.436	0.000	0.210	0.000	0.000					
Confidence in judicial system	0.047	0.077	0.008	0.093	0.036	-0.007	-0.038	-0.025	0.216	0.223				
	0.000	0.000	0.434	0.000	0.001	0.536	0.000	0.021	0.000	0.000				
Efficiency of government in delivering services	0.045	0.061	0.016	0.058	0.037	0.002	-0.038	-0.034	0.259	0.223	0.366			
	0.000	0.000	0.171	0.000	0.002	0.894	0.001	0.004	0.000	0.000	0.000			
Quality of Institutions index	0.037	0.023	0.004	-0.003	0.004	0.089	-0.084	-0.010	0.302	0.365	0.207	0.177		
	0.001	0.036	0.705	0.770	0.709	0.000	0.000	0.356	0.000	0.000	0.000	0.000		
General constraint-taxes and regulations	-0.125	-0.022	0.069	-0.118	0.002	0.010	0.048	0.004	-0.421	-0.262	-0.224	-0.296	-0.122	
	0.000	0.034	0.000	0.000	0.827	0.372	0.000	0.705	0.000	0.000	0.000	0.000	0.000	
Current VAT rate	-0.104	0.162	0.070	-0.090	-0.052	-0.009	0.082	0.029	-0.038	0.091	-0.113	-0.173	0.079	0.205
	0.000	0.000	0.000	0.000	0.000	0.396	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000