International Network for Economic Research

Working Paper 2012.3

Tracing the Link between Government Size and Growth: The Role of Public Sector Quality

by

Daniel Oto-Peralías
(Pablo de Olavide University)

and

Diego Romero-Ávila
(Pablo de Olavide University)

Tracing the Link between Government Size and Growth: The Role of Public Sector Quality

DANIEL OTO-PERALÍAS and DIEGO ROMERO-ÁVILA*

Pablo de Olavide University, Spain

Abstract

This paper shows evidence of strong heterogeneity in the relationship between government size and growth, depending on the quality of public sector institutions. Focusing on a wide sample of developed and developing countries over the period 1981-2005, we find that government size reduces growth when bureaucracy quality is low, whereas no significant effect is observed for sufficiently high levels of bureaucracy quality. The results hold both in cross-section and panel data analyses and are robust to a large number of robustness checks. These findings have important implications for assessing the role of government size in economic growth.

Keywords Government Size, Growth, Institutions, Public Sector Quality

JEL Classification E62, H11, O43

Acknowledgements: We thank Luis Ángeles, Jesús Crespo-Cuaresma, Octavio Fernández, Miguel León-Ledesma, Carlos Usabiaga, Simon Wren-Lewis and conference participants at the 14th INFER Annual Conference held in Coimbra for valuable comments and suggestions. We are thankful to the 14th INFER Annual Conference Committee for granting the INFER Joint Research Prize to this article. The authors acknowledge financial support from the Spanish Ministry of Science and Technology through grant ECO2009-13357 and from the Andalusian Council of Innovation and Science under grant number SEJ-4546.

* Corresponding Author: Diego Romero-Ávila. Pablo de Olavide University, Departamento de Economía, Métodos Cuantitativos e Historia Económica, Carretera de Utrera, Km. 1, Sevilla, Spain. Tel. +34 954348381, Fax. +34 954349339, E-mail: dromtor@upo.es.

Daniel Oto. Pablo de Olavide University, Departamento de Economía, Métodos Cuantitativos e Historia Económica, Carretera de Utrera, Km. 1, Sevilla, Spain. E-mail: dotoper@upo.es.

I. INTRODUCTION

The empirical literature on economic growth has been abundant during the past two decades. The seminal work of Barro (1991) popularized the cross-sectional econometric analysis of growth determinants across countries and since then his approach has been applied extensively by researchers. One issue that has attracted much interest from scholars is the effect of public policies on growth, with a particular focus on fiscal policy. More specifically, considerable attention has been directed to analyze the influence of government size – measured by government expenditure– on *per capita* GDP growth. Despite all the work conducted, there is no consensus among researchers on the importance of government size in affecting economic growth. Some authors find negative effects while others point out that the relationship is positive or not significant. In the first group we find Barro (1991), De la Fuente (1997) or Fölster and Henrekson (1997, 2001). Among the works that argue that the relationship between government size and growth is positive or non-significant are Caselli *et al.* (1996) and Agell *et al.* (1997, 2006).

Another strand of the growth literature underlines the importance of economic and political institutions. Since the work of Douglass C. North (1981),[1] many economists have been concerned about the impact of institutions on economic development. Among others, we can highlight the contributions by Hall and Jones (1999), Acemoglu *et al*. (2001, 2002, 2003), Rodrik *et al.* (2004) and Easterly and Levine (2003). There is widespread agreement that good institutions are a precondition for economic growth and this argument has been widely accepted not only by academics but also by international organizations such as the World Bank.[2]

By taking into consideration both branches of the literature, this paper focuses on the empirical link between government size and growth in a sample comprising developed and developing countries. We show that this relationship is nonlinear and varies with the quality of the public sector. Thus, we find that government size negatively affects economic growth only when bureaucratic quality is low. Behind this empirical finding there is the intuition that public spending may be negative for the real economy when the public administration is inefficient, corrupt or pursues the private interests of politicians and officials. By contrast, when quality standards in the public administration are high, politicians, officials and public employees are honest and do not abuse their power. Hence, in the situation where the

[1] See also North and Thomas (1973).

[2] The World Development Report 2002 is clear about the importance of institutions in economic growth: "The ability of the state to provide those institutions that support growth and poverty reduction—often referred to as good governance—is essential to development. Countries that have failed in this respect have seen incomes stagnate and poverty persist." (World Bank, 2002, p. 115).

government responds to citizen demands, works diligently and satisfactorily fulfils its functions, government size does not necessarily hinder economic growth.

Therefore, the central message of this paper is that government can be an obstacle to economic growth when public sector institutions are weak, but is neutral when bureaucratic quality is high. Consequently, there is no reason to reduce the size of government if public sector institutions are of good quality. Although this is an important issue, to the best of our knowledge this study is the first that takes into account the level of public sector quality when assessing the relationship between government size and economic growth.

In the first place, we estimate cross-section growth regressions for the period 1981-2005, where we analyze the effect of government size on long-term growth. All regressions show that the better the quality of public administration, the lower the negative effect of government size on growth, until the effect becomes insignificant when public sector quality is sufficiently high. In the second place, in order to overcome the shortcomings of the cross-section approach as well as to exploit the time variation of the data, we estimate panel regressions with the *system GMM estimator*. In a variety of specifications we also find consistent evidence showing that the negative relationship between government size and *per capita* GDP growth disappears when institutional quality is high.

These results contribute to shed light on the debate over whether government size is an obstacle to growth. Our analysis indicates the existence of high heterogeneity in the relationship between government size and growth that is driven by the level of public sector quality. Our work constitutes an example of the importance of taking into account the interactions between factors causing a phenomenon as complex as economic growth.

The remainder of the paper is organized as follows. Section 2 reviews the literature on the link between government size and growth as well as provides some arguments supporting the importance of the quality of public sector institutions in the link between government size and growth. Section 3 takes a first look at the data. Section 4 presents the results from the cross-section analysis, while section 5 reports the panel data estimations. Section 6 puts forward some policy implications and concludes.

II. OVERVIEW OF PREVIOUS LITERATURE AND THE IMPORTANCE OF PUBLIC SECTOR QUALITY

Early growth models formulated by Solow (1956) and Cass (1965), among others, conceived the long-run growth process as explained by exogenous forces such as technological progress and population growth. Under this paradigm, the role public policy can play is thus limited, being able to only affect the level of income. Endogenous growth theory pioneered by the work of Romer (1986, 1990), Lucas (1988), Barro (1990) and Rebelo (1991) points out

mechanisms by which policy variables can influence not only the level of output but also steady-state output growth. Theoretically, it has been argued that certain government expenditures such as national defense, basic economic institutions, human capital, research and development and infrastructure are likely to produce positive effects on growth (Barro, 1990; Lucas, 1988; Romer, 1990). These expenditures enter into the production function of the economy. They are characterized by positive externalities or the inability to be provided by the private sector.

As far as empirical growth studies are concerned, Barro (1991) finds evidence supporting the existence of a negative growth effect from government consumption (net of government expenditure on defense and education) from a pure cross-section approach applied to a wide sample of countries over the period 1960–85. Many studies have followed this line of research, estimating cross-section regressions that control for initial GDP levels, investment shares and a wide range of policy variables. Easterly and Rebelo (1993) argue that government size proxies such as aggregate expenditures or revenues expressed as a share of GDP fail to enter significantly in Barro regressions because they are highly correlated with initial income levels.

Some other studies have focused on the impact of the size of the public sector on growth. De la Fuente (1997) estimates growth specifications augmented with the size of the government, which enters the production function as an externality. De la Fuente finds for the OECD that aggregate government expenditures negatively affect growth and income levels over the period 1970–95, while aggregate revenues normally appear insignificant. Agell *et al.* (1997) analyze the impact of government size on growth in a cross-section of 23 OECD countries over the period 1970–90, finding that the coefficient on public sector size is unstable and loses easily the statistical significance. These results have been criticized by Fölster and Henrekson (1997) on the grounds that the cross-section methodology is problematic. They repeat Agell *et al*.'s (1997) exercise using a pooled two-stage least squares (2SLS) estimator to deal with endogeneity, finding evidence of a robust negative link between government size and growth. In a similar panel study, Fölster and Henrekson (2001) again report a negative effect of government size on growth. Focusing on a sample of UE-15 countries, Romero-Ávila and Strauch (2008) find that government size measured either with total expenditure or revenue shares, government consumption and direct taxation negatively affect growth rates of GDP *per capita*, while public investment has a positive impact.

More recently, Bergh and Karlsson (2010) study a panel of rich countries using ordinary least squares (OLS) and the BACE algorithm, finding that government size robustly correlates negatively with growth. They also find some evidence that countries with big government can use economic openness and economic policies to mitigate its negative effects. Focusing on a sample of industrial and developing countries, Mollick and Cabral (2011) observe strong

negative effects of government size on economic growth in yearly time spans, while the relation disappears in 5-year panels.

Overall, even though most studies find a negative effect of government size on growth, the extensive literature on the nexus of public finances and growth has not come to clear conclusions. This lack of robustness may result, among other things, from the presence of heterogeneity in the government size-growth relationship. We try to contribute to this literature by showing that the effect of government size on growth depends on the quality of public sector institutions. Importantly, this issue appears also related to the recent literature on the economic impact of institutions.

This new branch of the literature has received increasing interest since the work of North and Thomas (1973) and North (1981, 1991), whose general framework is taken as reference.[3] Institutions form the incentive structure of economic agents and are considered essential for the proper functioning of the economy. This argument received support early in a series of cross-country studies (Knack and Keefer, 1995; Mauro, 1995; and Hall and Jones, 1999) and has continued to attract the attention of economists since then. The papers of Acemoglu *et al.* (2001, 2002, 2003, 2005a, 2005b) have furthered this branch of the literature and have placed institutions as the fundamental requirement for economic development.[4]

This paper considers the importance of institutions for economic growth, but the term "institutions" is a general concept that encompasses very different factors. Since our goal is to assess the effect of government size, the institutions that interest us are those that relate to the public sector quality.[5] The central question is to investigate whether government size has a uniform effect on growth or whether this effect depends on the quality of the public sector. Although this is an important issue, it has not yet been satisfactorily tested empirically.

Beyond the conventional functional differentiation between productive and unproductive public expenditure, we can establish an institutional differentiation depending on the quality of the public entity that manages spending. The entity may be a public institution of high or low quality. In the first case, the entity is an institution with diligent employees and efficient operation, where priority is set on the interests of citizens and the services provided are highly valued by users. In the second case, it is an inefficient institution, where corruption is rampant and interests of politicians and officials prevail. In aggregate terms, there are countries with

[3] In fact, his definition of institutions is the most often cited by economists: "Institutions are the humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct) and formal rules (constitutions, laws, property rights)" (North, 1991).

[4] See also Rodrik *et al.* (2004), Easterly and Levine (2003) and La Porta *et al.* (2008).

[5] Throughout this paper we use interchangeably the terms "public sector", "government" and "public administration".

public sector institutions of high quality and countries with poor quality institutions. In the former, the effect of public sector spending may be overall positive or at least neutral for the functioning of the economy, while in the latter the effect is likely to be negative. We believe that this institutional distinction is crucial to determine the effect of government size on growth.

Under this approach, heterogeneity in public sector quality across countries is expected to influence the effect of government size both on the side of taxes as well as of expenditures. First, it is conceivable that when public sector quality is high, the distorting effect of taxes will be lower, because of –for example– greater stability in tax legislation (greater predictability), higher efficiency in tax collection, better design of tax system, lower tax evasion, etc. Second, higher public sector quality will be reflected in a more efficient use of resources, lower spending on paperwork, less corruption, better services, better outcomes (and therefore more positive externalities), and so on, all implying a greater positive effect of public spending.[6] In addition, highly valued public services are expected to reduce the distorting effects of taxes since citizens agree to pay more to the government for the services received.[7] It is reasonable that when preferences are oriented to sustain public expenditure paid as a counterpart for some public goods or services, the disincentives caused by taxes are lower. Arguably, these public services highly valued by citizens are likely to be provided to a larger extent when the quality of bureaucracy is high.

From the above discussion, we can expect the overall effect of government size on growth to be much less pervasive in a context of high public sector quality. Under these conditions, there are reasons to believe the positive effect of public spending to be greater and the negative effect of taxes to be lower.

A paper closely related to ours is Angelopoulos *et al.* (2008). They analyze a panel of developed and developing countries with OLS and 2SLS and find evidence of a nonlinear relationship between government spending and economic growth that depends on the efficiency of the public sector. Their results indicate that a highly efficient public sector leads

[6] A dramatic example of an inefficient (or corrupt) public administration comes from Uganda, where a survey of 250 primary schools revealed that the centers received only 13% of the budgetary allocation for non-wage expenditures. The remainder either disappeared or was used for a purpose other than education (Ablo and Reinikka, 1998 –taken from footnote 3 of Rajkumar and Swaroop, 2008).

[7] Opinion surveys provide evidence about the willingness of Europeans, for instance, to contribute more with the aim of maintaining welfare state services. EU citizens believe by a two-third majority that governments must preserve the social protection system even if it implies higher taxes (Taylor-Gooby, 1996). Similarly, a special Eurobarometer about the future of pension systems shows that 69% of EU citizens agree with "maintaining pension levels, even if this means raising taxes and contributions". It is interesting to note that the support is the strongest in Denmark and Finland, countries with a high quality public sector. By contrast, the support is the lowest in Portugal, Italy and Greece, which are characterized by relatively lower levels of bureaucracy quality (Eurobarometer, 2004).

to a positive effect of government size on growth. Our research differs from this on two main respects. First, we focus on measures of institutional quality rather than on a measure of public sector efficiency obtained using DEA methods. Second, our specifications introduce all constitutive terms of the interaction between government size and public sector quality.[8] Another difference is that we use the system GMM estimator versus the panel 2SLS employed by Angelopoulos *et al.* (2008).

Along similar lines, Rajkumar and Swaroop (2008) examine the role of governance in the effectiveness of public spending in achieving social outcomes for a wide sample of 91 countries. They show that differences in the efficacy of public spending can be largely explained by the quality of governance. In addition, Guseh (1997) studies the heterogeneity across political and economic systems in the effect of government size on growth in a sample of developing countries. He concludes that government size has negative effects on growth, which are three times greater in nondemocratic socialist countries than in democratic market countries.

III. A FIRST LOOK AT THE DATA

We estimate a basic Solow growth model augmented with human capital, government size, public sector quality and the interaction of the latter two. The analysis covers the years 1981-2005 and our sample of countries comprises both developed and developing economies. As a first concern, it is necessary to choose a proxy for government size and there are not many alternatives when one wants to cover a wide sample of countries. We use *General government final consumption expenditure* (% of GDP) from World Development Indicators (WDI) as our measure of government size, since other candidates such as total expenditure or total revenue cover fewer countries and are available only since the 1990s. The selected variable includes all current expenditures for purchases of goods and services (including compensation of employees) while excluding physical capital formation from the public sector.

Regarding the public sector quality indicator, we choose the variable *bureaucracy quality* from the International Country Risk Guide (ICRG). This subjective indicator measures, on a scale of 0 to 4, the strength and quality of the bureaucracy.[9] High-scoring countries are characterized by bureaucracies autonomous from political pressure and well-established mechanisms for recruitment and training. In these countries public administration governs without drastic changes in policy or interruptions in government services (see PRS Group,

[8] They do not include all constitutive terms of the interaction alleging a high correlation. However, Brambor *et al.* (2006) assert that an increase of multicollinearity does not justify the omission of constitutive terms.

[9] These country-specific annual scores are computed as the average over the 12 months for each year (PRS Group, 2011). This makes the variable take values over the continuum between 0 and 4.

2011). Arguably, bureaucracy quality is the indicator that best corresponds to the concept of public sector quality we aim to measure, i.e., the quality of public sector institutions. [10]

Another indicator that also fits well the concept of public sector quality is *government effectiveness* from the Governance Indicators of the World Bank (Kaufmann *et al.*, 2010). However, this indicator is only available since 1996. In fact, there are few data sources of institutional indicators covering the period under scrutiny. Fortunately, the project Polity IV offers the variable *Executive constraints (Decision rules)* that measures, on a scale of 1 to 7, "the extent of institutionalized constraints on the decision-making powers of chief executives", i.e., the "checks and balances between the various parts of the decision-making process" (Marshall *et al*., 2010). We use this objective indicator as a proxy for institutional quality under the reasonable assumption that the greater the checks and balances, the more predictable and diligent the public administration. Under these conditions, there will be less patronage relationships and greater accountability, which will lead to less corruption and more responsiveness and efficiency. We use bureaucracy quality as a main indicator, whereas executive constraints will be used in the extensive robustness checks.[11]

The basic model includes also real *per capita* GDP growth, initial real *per capita* GDP, secondary school enrolment and gross fixed capital formation over GDP, all from WDI. For robustness purposes, we also add the following control variables: openness (trade over GDP), inflation, life expectancy at birth, number of conflicts, institutionalized democracy, religion dummies, colony dummy, latitude, natural resources (rents over GDP) and an OECD dummy. The definitions and sources of the variables are presented in Appendix I, while Appendix II reports the descriptive statistics.

Table 1 provides a first look at the relationship between government size, public sector quality and growth. Along the different rows, countries are divided according to the percentile of bureaucracy quality in 1984 (the first year available), while columns show countries divided by the percentile of government consumption in 1981. The entries represent the average growth of real *per capita* GDP over the period 1981-2005.[12] The last row of data reveals a negative relationship between growth and government consumption. We see that countries with smaller government size grew on average 0.42 percentage points more than those with

[10] Since we are evaluating the impact of government size on growth, it is arguably appropriate to focus on the quality of government institutions. Furthermore, we prefer a measure of institutional quality rather than a measure of public sector efficiency because the former evaluates the characteristics and designs of institutions, whereas the latter is a measure of outcomes. It is theoretically more appealing to study how institutional arrangements influence the effect of government size on growth, instead of analyzing how public sector efficiency affects this effect (which is close to tautological since in the latter case it is evaluated how *the efficiency* of government activity affects *the result* of government activity).

[11] The correlation between both indicators is 0.64, indicating that they measure a similar phenomenon.

[12] The sample of countries is limited to the basic sample analyzed in cross-section regressions (see Appendix III).

larger governments. However, this relationship only holds for countries with medium and low bureaucracy quality, but not for countries with high quality institutions (greater than or equal to the 66th percentile). Therefore, this preliminary evidence reflects the intuition that a larger government does not need to hamper growth if public administration has the appropriate quality.

[Insert Table 1 about here]

Figure 1 explores the pattern observed in Table 1 and shows three scatter plots of the relationship between government size in 1981 and subsequent growth during the period 1981-2005.[13] Panels A, B and C split the sample into three groups of countries according to their public sector quality (in the same way as in Table 1). Panels A and B show a negative relationship between government size and growth for countries with medium and low public sector quality. In contrast, panel C shows a weak positive relationship between government size and growth for countries with high public sector quality. For example, Sweden and Denmark, countries with relatively large governments (with a public consumption share of almost 30%), grew as much as the U.S. and Australia, whose governments had a much smaller size.

[Insert Figure 1 about here]

In the remainder of the paper we analyze whether this result remains at the multivariate level both in cross-section and panel data estimations. Cross-sectional analysis can be understood as the analysis of the long-term effect on growth (average over 1981-2005), while panel estimations as the analysis of middle-term effects (5-year averages). Remarkably, we show that the main result holds: the effect of government size on growth is negative only when the quality of the public sector is low, while the effect vanishes when quality is sufficiently high.

IV. CROSS-SECTION REGRESSION ANALYSIS

IV.1. Baseline Results

We estimate an augmented Solow model of the following form:

$$growth_i = \alpha + \beta_1 \cdot income_{0i} + \beta_2 \cdot enrol_i + \beta_3 \cdot invest_i + \beta_4 \cdot govsize_i + \\ + \beta_5 \cdot bureaucracy_i + \beta_6 \cdot govsize \cdot bureaucracy_i + \varepsilon_i$$

where $growth_i$ is real *per capita* GDP growth, α is a constant term, $income_{0i}$ is the logarithm of initial real *per capita* GDP, $enrol_i$ represents secondary school enrolment, $invest_i$ stands for gross fixed capital formation over GDP, $govsize_i$ is the proxy for government size (general government consumption over GDP), $bureaucracy_i$ measures bureaucracy quality,

[13] The country abbreviations correspond to the 3-letter country code ISO-3166-1 alpha 3.

govsize·bureaucracy$_i$ is the interaction term between the last two and ε_i is the error term. The coefficients of interest throughout the paper are β_4 and β_6, both necessary to calculate the marginal effects of government size on growth.[14]

Table 2 reports results from OLS regressions for the basic specification. The sample is limited to those countries (85 in total) with non-missing data for the variables of the reference regression (column 6), so that variations in coefficients across specifications are not caused by substantial variations in the sample. Column 1 shows a basic growth regression without the interaction term between government size and bureaucracy quality. The signs of the coefficients are as expected, with positive growth effects of school enrolment, investment and bureaucracy quality, while negative effects of initial income (capturing convergence) and government size. The effect of the latter variable is economically significant and implies that an increase in government consumption by 10 percentage points of GDP reduces the long-term growth rate in more than one percentage point.

[Insert Table 2 about here]

In columns 2-4 we adopt a similar approach to Table and Figure 1, but now controlling for more variables. We divide the sample according to the quality of the public sector (bureaucracy quality). The table reports that the coefficient of government size shifts from -0.16 in countries with low quality, to -0.11 in countries of medium quality and to -0.06 in countries with high quality –the latter two being statistically insignificant. Therefore, these simple regressions show that the negative effect of government size is reduced as the quality of the public sector improves, becoming insignificant when quality becomes sufficiently high.

A more efficient way to capture this heterogeneity in the growth effect of government size is introducing an interaction term between this variable and bureaucracy quality. Regression 5 reports a negative coefficient for government size and a positive coefficient for the interaction term. As expected, the positive coefficient of the interaction term reflects cross-country heterogeneity in the relationship between government size and growth. The true effect of government size depends on the institutional context, in this case, the quality of the public sector.

However, a natural concern about this interaction model is the possible endogeneity of government consumption and bureaucracy quality. While averaging over a long period is a way to eliminate the effect of the business cycle on government consumption, other sources of simultaneity bias may still persist such as Wagner's law, demographic change or endogenous

[14] Note that the model includes all constitutive terms of the interaction. In order for coefficients to be meaningful, Brambor *et al.* (2006) show that interaction models must comprise all constitutive terms of the interaction. The possible increase in standard errors due to higher multicollinearity cannot be a reason for excluding, for example, the bureaucracy quality indicator.

selection of tax policy (see Fölster and Henrekson, 2001). Regarding bureaucracy quality, a long period of growth may raise the quality of public administration through, for example, the increase in the education of officers or the availability of better technical means. These problems of reverse causation can lead to biased coefficients. An effective way to address this issue is by using the initial values of the variables. This is done in regression 6, considered as the reference model from this point onwards. Again, government size has a negative coefficient (-0.11) while the interaction term is positive (0.04), both exhibiting high statistical significance.

At first glance, this result can be seen as a positive contribution of government size to growth when public sector quality is high enough (above the value at which the marginal effect becomes positive, that is, $-\beta_4 / \beta_6$). In fact, the usual superficial interpretation is that the effect is negative for low bureaucracy quality and positive for high quality levels. However, it is crucial to take into account the statistical significance of the coefficients, which is not always done. A careful interpretation of the coefficients is necessary in order to analyze how public sector quality affects the relationship between government size and growth.

Since we are interested in analyzing the marginal effect of government size, it should be kept in mind that the coefficient reported in the table indicates the marginal effect when bureaucracy quality is 0. We must conduct a conditional interpretation of the marginal effect of government size for each value of bureaucracy quality (see Brambor *et al.*, 2006). Consequently, the marginal effect is given by:

$$\frac{\partial growth}{\partial govsize} = \beta_4 + \beta_6 \cdot bureaucracy$$

where β_4 is the coefficient on government size and β_6 the coefficient on the interaction term. It is also necessary to properly calculate the standard error of the marginal effect, which is given by (see Aiken and West, 1991):

$$\hat{\sigma}_{\frac{\partial growth}{\partial govsize}} = \sqrt{\text{var}(\hat{\beta}_4) + bureaucracy^2 \cdot \text{var}(\hat{\beta}_6) + 2 \cdot bureaucracy \cdot \text{cov}(\hat{\beta}_4 \cdot \hat{\beta}_6)}$$

Once we calculate the marginal effect of government size for each value of bureaucracy quality and the associated standard errors, we can draw the graph depicted in Figure 2. It shows that the marginal effect of government consumption is negative and significant only for low values of bureaucracy quality. In the middle of the scale (value 2), the marginal effect is not significant and for score values of 3 and 4 the effect is positive but insignificant. Given that the median value of bureaucracy quality is 2 (see Appendix II b), it is interesting to note that over half of the countries correspond to the graph area where the effect is statistically insignificant. Hence, this figure summarizes the message of the paper: the size of government

affects growth negatively when the quality of the public sector is low, whereas no significant effect is found when bureaucracy quality is sufficiently high.

[Insert Figure 2 about here]

IV.2. Robustness Checks: Control Variables and Outliers

The reference model is a basic specification that includes only a few core variables. An immediate criticism is that it may suffer from omitted variable bias. Another common problem is the effect of outliers, which can drive the results. Tables 3a and 3b address these two issues. The former shows the ordinary estimated coefficients, while the latter presents the coefficients and standard errors of the marginal effect of government size for different values of bureaucracy quality. Column 1 reproduces the reference model and columns 2 to 11 introduce additional factors that may affect growth.

[Insert Tables 3a and 3b about here]

Many scholars have linked trade with growth, underlining the role of international trade as a driver of productivity improvement (e.g., Sachs and Warner, 1995; Frankel and Romer, 1999). In column 2 we add a trade openness variable (imports plus exports over GDP). Remarkably, the basic finding on the significance of the coefficients on government size and the interaction term is not affected, whereas trade openness is highly insignificant. The inflation rate is often included in growth models as a measure of macroeconomic stability (Barro and Sala-i-Martin, 2004). We investigate in column 3 whether the nonlinear relationship between government size and growth is altered by the inclusion of inflation.[15] The basic results remain unchanged, and the inflation rate enters with the right sign but is insignificant. Another common variable in growth specifications is life expectancy (Barro and Sala-i-Martin, 2004). This variable has a highly significantly positive impact on growth (see column 4). Its inclusion reduces the significance of the coefficients on government size and the interaction term. As shown in Table 3b, the negative marginal effect of government size becomes smaller and only significant for the lowest bureaucracy quality level.

Column 5 introduces the variable labelled as number of armed conflicts (both internal and external). In addition to hindering a country's growth potential (e.g. Murdoch and Sandler, 2004; Kang and Meernik, 2005), this variable addresses the concern that government size may be influenced by the need for public spending derived from a military mobilization. Thus, we might expect a military campaign to reduce growth and increase public spending. Including the number of conflicts does not affect the baseline results, although in this case the marginal effect of government size is positive and significant (0.07) when bureaucracy quality is high

[15] Due to the high variability of the inflation rate, we introduce the natural logarithm of (1 + inflation rate).

(see Table 3b, column 5). The variable number of conflicts enters with an unexpected sign but is statistically insignificant.

The next control variable is *Institutionalized democracy* from project Polity IV. The effect of democracy on economic growth has been studied extensively (e.g., Przeworski and Limongi, 1993; Helliwell, 1994; Tavares and Wacziarg, 2001). Its inclusion in column 6 does not change the results of the previous specifications, while its coefficient is positive and highly significant. From the work of Max Weber (1976), religion is seen as a potential determinant of economic development. To control for this fact, we introduce the fraction of population that follows the different religions. Column 7 reports the p-value of the joint significance test, which is much higher than the acceptable levels of statistical significance. Our baseline results remain essentially unchanged, although it is interesting to note that the marginal effect of government size is positive (0.09) and significant for the highest level of bureaucracy quality. Another historical factor associated with growth performance is colonialism. It is commonly argued that the dependence of the colonies on the metropolis has been harmful to their subsequent development (Larrain, 1989). Column 8 introduces a dummy variable capturing whether a country has never been a colony. Again, its inclusion does not affect the main results.

The role of geography in economic growth has been highlighted by authors such as Sachs (Gallup et al., 1999; McArthur and Sachs 2001; Sachs 2003). We include latitude in column 9 to examine whether our results are robust to the introduction of a proxy for geography. The results remain unchanged, despite latitude appearing with a high economic and statistical significance. Column 10 introduces the percentage of natural resources (mineral, gas and oil rents) over GDP to account for the natural resource curse (e.g., Sachs and Warner, 2001). The evidence indicates the existence of a negative and significant coefficient on natural resources. Once again the baseline results remain robust. Finally, we can hypothesize that the nonlinear relationship between government size and growth may be driven by rich countries, which tend to have more public spending, better institutions and a higher rate of growth. Column 11 shows that the results are not driven by rich countries (OECD members), which exhibit significantly higher growth than the average country.[16]

Columns 12 to 16 of Tables 3a and 3b evaluate the influence of outliers. We consider several statistical definitions of outliers such as leverage, standardized residuals, studentized residuals, Cook's distance and DFITS. Once outliers are detected, we exclude these countries

[16] Additionally, we have introduced government consumption squared to capture the possible nonlinearity of the effect of government size at different levels. The quadratic term is insignificant, while the interaction between government size and bureaucracy quality maintains the coefficient and the statistical significance. We also included tax revenues as a share of GDP in order to control for both sides of the government budget constraint (Kneller et al., 1999). Remarkably, the results remain fairly unchanged, with the interaction between government size and bureaucracy quality remaining highly significant. Besides, the coefficient on tax revenues appears highly insignificant. These results hold when we employ instrumental variables estimation as in subsection 4.4.

and re-run the regressions. The table shows that the results are highly robust to the presence of outliers.[17]

In conclusion, our main empirical finding remains robust to a wide range of control variables as well as to the presence of outliers.[18] The size of government negatively affects growth only when bureaucracy quality is weak (with a score less than 2 or 3, depending on the specification), thus indicating a high degree of heterogeneity in the effect of government size across countries.

IV.3. Robustness Checks: Executive Constraints as a Proxy for Public Sector Quality

As an additional robustness check, Tables 4a and 4b present all the previous regressions but now using executive constraints as institutional quality indicator. In Section 3 we argued that this variable is a good proxy for the quality of the public sector. Since bureaucratic quality is a subjective (perception-based) measure constructed by experts, the use of executive constraints should be a good complement to testing the robustness of our hypothesis, because this indicator is an objective measure of the accountability of political power.

[Insert Tables 4a and 4b about here]

The tables show that the results remain unchanged when we use executive constraints instead of bureaucracy quality. Interestingly, Table 4b shows that for six specifications the marginal effect of government size is positive and significant (0.04) when executive constraints is equal to 7. In addition, the main finding remains the same: the marginal effect of government size is negative only when the quality of the public sector is low. In this case, for values of executive constraints higher than 4 the marginal effect is generally insignificant.

IV.4. Further Robustness Checks: Instrumental Variables Estimation

In Tables 3a and 3b we controlled for the endogeneity of government size and bureaucracy quality using the initial values of both variables. Another widely used alternative to deal with the endogeneity problem is via 2SLS. This estimator requires finding variables that meet two conditions before they can be considered as good instruments: 1) relevance: to be relevantly related to the endogenous variable, and 2) exclusion restriction: to have no effect on growth, other than its effect through the endogenous variable. Finding valid instruments solves the endogeneity problem, but this is not an easy task. In fact, demonstrating that instruments fully

[17] The cut-offs of the detection methods are the following: leverage, $2 \cdot k/n$; standardized residuals, |2|; studentized residuals, |2|; Cook's distance, $4/n$; DFITS, $\left|2 \cdot \sqrt{k/n}\right|$, where k is the number of parameters and n is the number of observations (Belsley *et al.*, 2004).

[18] A quick way to see the robustness of the results is by looking at Table 3b. In rows 1 and 2 (low public sector quality) the marginal effect of government size is *always* negative and significant (except in column 4, where it is significant only in the first row). In contrast, in the last two rows (high public sector quality) the marginal effect is *never* negative and significant.

meet the exclusion restriction is very difficult, if not impossible. In addressing these concerns, we check whether these two conditions are satisfied through the tests of overidentification and underidentification.

Based on previous studies that support the importance of legal traditions in the quality of institutions (e.g., La Porta *et al*., 1999), we employ legal origin as an instrument for our institutional variable under the assumption that different legal traditions contributed in different ways to build the public administrative system across countries.[19] In addition, we use the initial value of government size and its interaction with legal origin as instruments for government size and the interaction term, respectively. Tables 5a and 5b present the results.

[Insert Tables 5a and 5b about here]

Compared to the results from OLS estimations (Table 3b), Table 5b shows that the negative marginal effect of government size is now greater. For example, comparing column 1 of both tables (reference model), the coefficient changes from -0.11 to -0.26 when bureaucracy quality is 0 and from -0.07 to -0.18 when bureaucracy quality is 1. With a level of quality equal to 2, most regressions report a statistically significant negative coefficient. Still, we can confirm that the negative marginal effect of government size again becomes statistically insignificant as bureaucracy quality rises. In fact, Table 5b reports that for almost all specifications the marginal effect is not significant when bureaucracy quality is equal to 3. The same occurs for all specifications when the score is 4. It is worth noting that according to column 1 the effect becomes insignificant when going from a quality score of 2 to 3. More specifically, we calculate that the effect becomes insignificant when public sector quality is equal to 2.5 (coefficient= -0.06; Std. Err.= 0.04). Just over 40% of the countries in our sample have higher bureaucracy quality than this value. Therefore, for these countries there is no statistically significant relationship between government size and growth.

With regard to the validity of the instruments, Table 5a shows that all regressions pass the underidentification and overidentification tests. On the one hand, we reject the null hypothesis that the equation is underidentified; so the excluded instruments are relevant. On the other, we fail to reject the null hypothesis with the test of overidentifying restrictions, i.e., the instruments are valid (uncorrelated with the error term) and correctly excluded from the estimated equation (Baum *et al*., 2010).

In summary, there is evidence of a high degree of heterogeneity in the effect of government size on long-term growth, as this effect depends on the quality of public sector institutions. We have observed throughout this section that the marginal effect of government size on growth is negative and significant only when public sector quality is low. This evidence is

[19] Many papers use legal origin as instrument for institutions (see, among others, Acemoglu and Johnson, 2005; Glaeser *et al.*, 2004; Ahlerup *et al*., 2009).

robust to the inclusion of a wide range of control variables, the presence of outliers, the use of an objective indicator of institutional quality and the use of 2SLS. Therefore, the size of the public sector should not be the only concern of economists and policymakers. The quality of the public sector is key to accounting for the effects of government size on the real economy, which appears broadly in line with the studies of Angelopoulos et *al.* (2008) and Rajkumar and Swaroop (2008).

V. PANEL DATA ANALYSIS

V.1. Basic Panel Regressions

Thus far, all our empirical results are based on cross-section analysis. We now turn to panel estimation methods to further test the empirical regularity found above. This exercise is interesting for at least two reasons: first, panel estimations exploit the temporal variation in the data, thus improving efficiency; and second, better estimators are available to control for endogeneity by using lags of the variables as instruments. However, we must note that this constitutes a shift from the analysis of long-term growth (25-year average) to the analysis of medium-term growth (5-year averages).

The estimated model is similar to that of the previous section:

$$growth_{i,t} = \beta_1 \cdot income_{0i,t-1} + \beta_2 \cdot enrol_{i,t} + \beta_3 \cdot invest_{i,t} + \beta_4 \cdot govsize_{i,t} + \\ + \beta_5 \cdot bureaucracy_{i,t} + \beta_6 \cdot govsize \cdot bureaucracy_{i,t} + \alpha_i + \theta_t + \varepsilon_{i,t}$$

where α_i is a set of unobserved country-specific effects (to account for time-invariant country-specific structural characteristics), θ_t is a set of time-specific effects (to account for common shocks affecting all countries in a given period) and the remaining variables are the same as in Section 4.1. We have a *small T, large N* unbalanced panel consisting of 5 periods of 5-year averages (from 1981-1985 to 2001-2005) and a maximum of 450 observations and 130 countries, depending on the specification.[20]

The difference GMM estimator (Arellano and Bond, 1991) eliminates the Nickel (1981) bias caused by the correlation between lagged output and country-specific effects and uses previous realizations of the regressors to instrument for their current values in the first-

[20] In the cross-section analysis, we confined ourselves to a sample of 85 countries, for which complete data were available for the reference model, so that changes in the coefficients across specifications were not driven by substantial changes in the number of countries included. In contrast, with panel methods we extend the number of countries to a maximum of 130 for the specification with bureaucracy quality, while the sample rises to 146 countries for the specification with executive constraints. See Appendix III for the list of countries considered in each case. A further reason for including more countries in the panel data analysis than in cross-section regressions is that even though for some of the countries there is no data available for the first two 5-year periods, there is more data availability for the more recent 5-year periods. Thus, in the cross-section analysis, this would translate into missing values for some of the countries for which data were not available during the first half of the period under scrutiny, this being the reason for omitting such countries.

differenced specification. However, Arellano and Bover (1995) and Blundell and Bond (1998) show that in the case of persistent regressors –such as institutional variables– lagged levels of the variables are weak instruments for the first-differenced regressors. This leads to a fall in precision as well as to biased coefficients. To overcome these shortcomings, these authors recommend the use of the *system GMM estimator* that utilizes instruments in levels and first-differences to improve in efficiency. Thus, we will estimate the model using this estimator.

The consistency of the *system estimator* depends on the validity of the instruments and the absence of serial correlation of second-order in the first-differenced error term. Therefore, we test these assumptions using the Hansen test for over-identifying restrictions and the test for second-order autocorrelation proposed by Arellano and Bond (1991). Failing to reject the null hypotheses of overall validity of the instruments and absence of second-order serial correlation in the first-differenced error for the respective tests would give support to the model.

Tables 6a and 6b present the results from the *system GMM estimator*. In addition to the usual *gmm-style* instruments, we use as excluded instruments the population dependency ratio and legal origin. The former is considered as a determinant (and instrument) of government size (Angelopoulos *et al*., 2008), whereas legal origin acts as an instrument for institutional quality.[21]

[Insert Tables 6a and 6b about here]

Column 1 shows the reference model where government size has a negative coefficient while the interaction term has the expected positive sign. Again, the marginal effect of government consumption depends on the quality level of the public sector. In this case, the marginal effect is no longer statistically significant when bureaucracy quality is 4. These results differ slightly from those obtained in cross-sectional regressions, where a score of bureaucracy quality of 2 or 3 was sufficient to render the marginal effect of government size statistically insignificant. However, these differences are not surprising since we are analyzing the medium rather than the long term, and the effect of public sector size may vary from one horizon to another. More specifically, the results indicate that from values of bureaucracy quality above 3.3 the effect is not significant; so for 20% of the sample the marginal effects of government size is insignificant. Therefore, for the fraction of countries with the highest quality in public sector institutions, the size of government does not affect economic growth.

[21] The complete specification of the model is characterized as follows: the endogenous variables are *invest, govsize* and the interaction term *govsize·bureaucracy*, while the remaining variables are predetermined. The exogenous variables are the period dummies. For the first difference equation, second and previous lags of endogenous variables and first and previous lags of predetermined variables are used as instruments. For the level equation, the lagged first-difference of endogenous variables and the first-difference of predetermined variables are used as instruments. We shall see later that the results are robust to changes in the specification (Tables 8a and 8b).

In columns 2-7 we show that the results are robust to the inclusion of several control variables.[22] Column 8 drops OECD members and shows that the results are not driven by rich countries. Interestingly, Columns 2 to 8 of Table 6b show that the marginal effect of government size is not statistically significant when institutional quality is relatively high (for scores greater than 2 or 3, depending on the specification). Moreover, it is important to note that the Hansen test for over-identifying restrictions and the test for second-order serial correlation are not rejected in any specification, thereby supporting the validity of the model.

V.2. Robustness with Executive Constraints as Public Sector Quality Indicator

In the previous paragraph we reported that our baseline result remains unaltered when we employ the *system GMM estimator* with our main proxy for public sector quality. We now proceed to check whether the results are essentially the same with executive constraints as the institutional variable. With panel data, this proxy for public sector quality is even more appealing because it is an objective indicator about the institutional features of government, with a very transparent coding method. This makes it a more suitable measure for accounting for the time series variation in public sector quality than perception-based indicators, because temporal variation of the indicator better reflects real changes (Arndt and Oman, 2006).

Tables 7a and 7b replicate the analysis conducted in the previous two tables but with executive constraints. They provide additional evidence for our main result: the marginal effect of government size on growth varies with the quality of public sector institutions. Focusing on the reference model, the marginal effect is not significant for values of executive constraints equal to or greater than 5, although the precise cut-off varies from one specification to another. The tests of overidentification and second-order serial correlation are satisfied, except for specification 8, for which the Hansen overidentification test rejects the null at the 5% level. We conclude that with executive constraints as an alternative indicator of institutional quality, the message that the paper tries to convey remains completely unaltered.

[Insert Tables 7a and 7b about here]

V.3. Robustness to Different Specifications

In Tables 8a and 8b we examine whether the results are driven by a particular specification choice. The first column reproduces the reference model. The next three columns address whether the results depend on the introduction of any of the excluded instruments. Column 2 only uses legal origin as excluded instrument, while column 3 only employs the population dependency ratio. In both regressions our conclusion remains unchanged. Column 4 goes one step further and eliminates all excluded instruments. Again, the results are essentially the same. Column 5 uses orthogonal deviations rather than first differences, which maximizes the

[22] See the motivation for the inclusion of these controls in Section 4.2.

sample size in panels with gaps (Roodman, 2006). Model 6 additionally removes the excluded instruments. In both cases the results remain unchanged.

Following the suggestion of Roodman (2006), regressions 7 and 8 restrict the number of instruments to verify the robustness of the coefficients to a reduction in the instruments set. When we limit the instruments to lags 1 and 2, the results remain unaltered both with and without excluded instruments. Finally, specifications 9 and 10 employ the two-step estimator. Again, the results are unaffected by this change.[23]

To summarize, the panel data analysis of this section conducted with the *system GMM estimator* has provided additional strong evidence of heterogeneity in the relationship between government size and growth. The effect of government size depends on the quality of the public sector; the effect being negative at low quality levels, while vanishing when quality is high. The results are robust to the introduction of control variables, the use of executive constraints as an alternative indicator of public sector quality and to changes in the specification.[24]

VI. CONCLUSIONS

Can one correctly interpret the relationship between government size and growth irrespective of the quality of the public sector? The answer this paper provides is clearly no. Heterogeneity in the relationship between government size and growth may be one of the reasons for the lack of consensus among scholars on the effect of government size on the real economy. We have contributed to this debate by emphasizing that the effect of government size is influenced by the quality of public sector institutions. In other words, the institutional context must be taken into account and it would be misleading to defend the homogeneity of the effect of government size on growth across countries.

Our conclusion is that government size affects growth negatively when the quality of the public sector is low, but not when public sector quality is high. In the latter case the evidence shows that there is no significant effect (either positive or negative). This finding holds both in cross-section and panel data analyses and is robust to a large number of robustness checks.

[23] Additionally, we have examined the robustness to considering all variables as endogenous (except for the period dummies). The results remain qualitatively unchanged, although in this case the test of overidentification is rejected.

[24] A final point deserves comment. The proxy used for government size does not include investments in fixed capital and, therefore, much of the public spending commonly considered to be productive. The addition of public investment to our proxy "government consumption" presumably would increase the positive effect (or reduce the negative effect) of government size on growth. But this is not done here because public investment is already included in the variable gross fixed capital formation. Moreover, due to data unavailability, differentiating between public and private investment would imply a substantial reduction of the sample, both along the time and cross-section dimensions.

The observed heterogeneity in the effect of government size on the real economy appears in line with previous work by Angelopoulos *et al.* (2008) and Rajkumar and Swaroop (2008).

Our investigation has shown that, in addition to distinguishing between productive and unproductive government spending (Barro, 1990), it is crucial to differentiate on the basis of the quality of the entity that manages public spending. At the aggregate level, we find that when public spending is managed by a high quality public sector, the effect on growth is no longer negative.

The present economic crisis is redefining the role of government and the public sector in the economy. From our results it follows that researchers and policymakers should be concerned not only with the quantity (size) of the public sector, but also with the quality of public sector institutions. When quality is high, the magnitude of government spending does not appear to be growth-inhibiting. In contrast, when quality is low, government size becomes a problem for growth. It is thus important to consider these two dimensions when analyzing the role of government in economic growth. Arguably, economic policies cannot be assessed regardless of the institutional context. Finally, future research could explore the specific transmission channels behind the nonlinear relationship between government size and growth.

REFERENCES

Ablo, E. and Reinikka, R. (1998). Do Budgets Really Matter? Evidence from Public Spending on Education and Health in Uganda, Policy Research Working Paper 1926. Development economics research group. World Bank, Washington, D.C.

Acemoglu, D. and Johnson, S. (2005). Unbundling Institutions, *Journal of Political Economy*. 113(5): 949-995.

Acemoglu, D., Johnson, S. and Robinson, J. (2001). The Colonial Origins of Comparative Development: An Empirical Investigation, *American Economic Review*. 91 (5): 1369-401.

Acemoglu, D., Johnson, S. and Robinson, J. (2002). Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution, *Quarterly Journal of Economics*. 117 (4): 1231-1294.

Acemoglu, D., Johnson, S. and Robinson, J. (2005a). Institutions as a Fundamental Cause of Long-run Growth, in P. Aghion and S. Durlauf, eds., *Handbook of Economic Growth*, volume 1A, chapter 6, Elsevier, 865–934.

Acemoglu, D., Johnson, S. and Robinson, J. (2005b). The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth, *American Economic Review*. 95(3): 546–579

Acemoglu, D., Johnson, S. and Robinson, J. and Thaicharoen, Y. (2003). Institutional Causes, Macroeconomic Symptoms: Volatility, Crises and Growth, *Journal of Monetary Economics*. 50: 49-123.

Agell, J., Lindh, T. and Ohlsson, H. (1997). Growth and the Public Sector: A Critical Review Essay, *European Journal of Political Economy*. 13: 33–52.

Agell, J., Ohlsson, H. and Skogman, T. P. (2006). Growth Effects of Government Expenditure and Taxation in Rich Countries: A Comment, *European Economic Review*. 50: 211–218.

Ahlerup, P., Olsson, O. and Yanagizawa, D. (2009). Social Capital vs. Institutions in the Growth Process, *European Journal of Political Economy*. 25: 1–14.

Aiken, L. and West, S. (1991). *Multiple Regression: Testing and Interpreting Interactions*. London: Sage Publications.

Angelopoulos, K., Philippopoulos, A. and Tsionas, E. (2008). Does Public Sector Efficiency Matter? Revisiting the Relation between Fiscal Size and Economic Growth in a World Sample, *Public Choice*. 137: 245–278.

Arellano, M. and Bond S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economic Studies*. 58: 277-297.

Arellano, M. and Bover, O. (1995). Another Look at the Instrumental Variable Estimation of Error-Components Models, *Journal of Econometrics*. 68: 29-51.

Arndt, C. and Oman, C. (2006). *Uses and Abuses of Governance Indicators*. OECD Development Centre Studies, OECD, Paris.

Barro, R. (1990). Government Spending in a Simple Model of Endogenous Growth, *Journal of Political Economics*. 98: 103–125.

Barro, R. (1991). Economic Growth in a Cross-section of Countries, *Quarterly Journal of Economics*. 6 (2): 407–443.

Barro, R. and Sala-i-Martin, X. (2004). *Economic Growth*, 2nd ed. Cambridge, Massachusetts: The MIT Press.

Baum, C.F., Schaffer, M. E. and Stillman, S. (2010). ivreg2: Stata Module for Extended Instrumental Variables/2SLS, GMM and AC/HAC, LIML and k-class Regression. http://ideas.repec.org/c/boc/bocode/s425401.html

Belsley, D., Kuh, E. and Welsch, R. (2004). *Regression Diagnostics. Identifying Influential Data and Sources of Collinearity*. New Jersey: John Wiley & Sons.

Bergh, A. and Karlsson, M. (2010). Government Size and Growth: Accounting for Economic Freedom and Globalization, *Public Choice*. 142: 195–213.

Blundell, R. and Bond, S. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models, *Journal of Econometrics*. 87: 115-143.

Brambor, T., Clark, W. and Golder, M. (2006). Understanding Interaction Models: Improving Empirical Analyses, *Political Analysis*. 14 (1): 63–82.

Caselli, F., Esquivel, G. and Lefort, F. (1996). Reopening the Convergence Debate: A New Look at Cross-country Growth Empirics, *Journal of Economic Growth*. 1(3): 363–389.

Cass, D. (1965). Optimum Growth in an Aggregative Model of Capital Accumulation, *Review of Economic Studies*. 32: 233–240.

De la Fuente, A. (1997). Fiscal Policy and Economic Growth in the OECD, CEPR Working Paper. 1755, 1–45. Centre for Economic Policy Research, London.

Easterly, W. and Levine, R. (2003). Tropics, Germs, and Crops: How Endowments Influence Economic Development, *Journal of Monetary Economics*. 50 (1): 3–39.

Easterly, W. and Rebelo, S. (1993). Fiscal Policy and Economic Growth: An Empirical Investigation, *Journal of Monetary Economics*. 32 (3): 417–458.

Eurobarometer (2004). *The Future of Pension Systems*, Special Eurobarometer. 161/ Wave 56.1- European Opinion Research Group EEIG. European Commission.

Fölster, S. and Henrekson, M. (1997). Growth and the Public Sector: A Critique of the Critics, *European Journal of Political Economy*. 15: 337–358.

Fölster, S. and Henrekson, M. (2001). Growth Effects of Government Expenditure and Taxation in Rich Countries, *European Economic Review*. 45: 1501–1520.

Frankel, J. and Romer, D. (1999). Does Trade Cause Growth?, *American Economic Review*. 89 (3): 379-399.

Gallup, J., Sachs, J. and Mellinger, A. (1999). Geography and Economic Development, *International Regional Science Review*. 22: 179-232.

Glaeser, E., La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (2004). Do Institutions Cause Growth?, *Journal of Economic Growth*. 9: 271-303.

Gleditsch, N. P., Wallensteen, P., Eriksson, M., Sollenberg, M. and Strand, H. (2002). Armed Conflict 1946–2001: A New Dataset, *Journal of Peace Research*. 39(5): 615–637.

Guseh, J. (1997). Government Size and Economic Growth in Developing Countries: A Political-Economy Framework, *Journal of Macroeconomics.* 19 (1): 175–192.

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.

Helliwell, J. (1994). Empirical Linkages Between Democracy and Economic Growth, *British Journal of Political Science*. 24: 225-248.

Kang, S. and Meernik, J. (2005). Civil War Destruction and the Prospects for Economic Growth, *Journal of Politics*. 67 (1): 88-109.

Kaufmann, D., Kraay, A. and Mastruzzi, M. (2010). The Worldwide Governance Indicators: Methodology and Analytical Issues, World Bank Policy Research Working Paper. No. 5430, World Bank, Washington, D.C.

Knack, S. and Keefer, P. (1995). Institutions and Economic Performance: Cross-country Tests Using Alternative Measures, *Economics and Politics*. 7 (3): 207-27.

Kneller R., Bleaney, M. F. and Gemmell, N. (1999). Fiscal Policy and Growth: Evidence from OECD Countries, *Journal of Public Economics*. 74: 171–190.

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

La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (2008). The Economic Consequences of Legal Origins, *Journal of Economic Literature*. 46 (2): 285–332.

Larraín, J. (1989). *Theories of Development. Capitalism, Colonialism and Dependency*. Cambridge: Polity Press.

Lucas, R. E. (1988). On the Mechanics of Economic Development, *Journal of Monetary Economics*. 22: 3–42.

McArthur, J. and Sachs, J. (2001). Institutions and Geography: Comment on Acemoglu, Johnson and Robinson (2000), NBER Working Paper. No. 8114, National Bureau of Economic Research, Cambridge, MA.

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

Mollick, A. and Cabral, R. (2011). Government Size and Output Growth: The Effects of ‘‘Averaging Out’’, *KYKLOS*. 64(1): 122-137.

Marshall, M., Gurr, T. and Jaggers, K. (2010). Polity IV Project. Political Regime Characteristics and Transitions, 1800-2009: Dataset Users’ Manual. Center for Systemic Peace, Vienna.

Murdoch, J. and Sandler, T. (2004). Civil Wars and Economic Growth: Spatial Dispersion, *American Journal of Political Science*. 48 (1): 138-151.

Nickell, S. (1981). Biases in Dynamic Models with Fixed Effects, *Econometrica*. 49: 1417-1426.

North, D. (1981). *Structure and Change in Economic History*. New York: W.W. Norton & Co.

North, D. (1991). Institutions, *The Journal of Economic Perspectives*. 5(1): 97-112

North, D. and Thomas, R. (1973). *The Rise of the Western World: A New Economic History*. Cambridge: Cambridge University Press.

PRS Group (2011). ICRG Methodology. On-line publication (Accessed on 28/10/2011 <http://www.prsgroup.com/ICRG_Methodology.aspx>.

Przeworski, A. and Limongi, F. (1993). Political Regimes and Economic Growth, *Journal of Economic Perspectives*. 7 (3): 51-69.

Rajkumar, A. and Swaroop, V. (2008). Public Spending and Outcomes: Does Governance Matter?, *Journal of Development Economics*. 86: 96-111.

Rebelo, S. (1991). Long-run Policy Analysis and Long-run Growth, *Journal of Political Economy*. 99(3): 500–521.

Rodrik, D., Subramanian, A. and Trebbi, F. (2004). Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development, *Journal of Economic Growth*. 9: 131-165.

Romer, P. (1986). Increasing Returns and Long-run Growth, *Journal of Political Economy*. 94(5): 1002–1037.

Romer, P. (1990). Endogenous Technological Change, *Journal of Political Economy*. 98(5): 71–102.

Romero-Ávila, D. and Strauch, R. (2008). Public Finances and Long-term Growth in Europe: Evidence from a Panel Data Analysis, *European Journal of Political Economy*. 24: 172–191.

Roodman, D. 2009. How to do xtabond2: An Introduction to Difference and System GMM in Stata, *Stata Journal*. 9(1): 86-136.

Sachs, J. and Warner, A. (2001). The Curse of Natural Resources, *European Economic Review*. 45 (4-6): 827-838.

Sachs, J. (2003). Institutions don't Rule: Direct Effects of Geography on per Capita Income, NBER Working Paper. No. 9490. National Bureau of Economic Research, Cambridge, MA.

Sachs, J. and Warner, A. (1995). Economic Reform and the Process of Global Integration, *Brookings Papers on Economic Activity*. 1: 1-118.

Solow, R. M. (1956). A Contribution to the Theory of Economic Growth, *Quarterly Journal of Economics*. 70: 65–94.

Tavares, J. and Wacziarg, R. (2001). How Democracy Affects Growth, *European Economic Review*. 45: 1341-1378.

Taylor-Gooby, P. (1996). Paying for Welfare: The View from Europe, *The Political Quarterly.* 67(2): 116–126.

Teorell, J., Samanni, M., Holmberg, S. and Rothstein, B. (2011). The Quality of Government Dataset, version 6Apr11. The Quality of Government Institute, University of Gothenburg, Gothenburg, http://www.qog.pol.gu.se.

Weber, M. (1976 [1904-1905]). *The Protestant Ethic and the Spirit of Capitalism*. London: Allen and Unwin.

World Bank (2002). *World Development Report 2002: Building Institutions for Markets*. New York: Oxford University Press.

World Bank (2011). *World Development Indicators 2011 Database*. World Bank Publishing Services, World Bank, Washington, D.C.

TABLES AND FIGURES

Table 1

Government Size, Public Sector Quality and Growth

Average growth 1981-2005

		Government size (General government consumption, 1981)			
		Low (< pc 33)	Middle (>= pc 33 & < pc 66)	High (>= pc 66)	*Total*
Public sector quality (Bureaucracy quality, 1984)	Low (< pc 33)	0.81 *13*	0.83 *7*	-0.14 *8*	0.54 *28*
	Middle (>= pc 33 & < pc 66)	2.16 *8*	1.61 *12*	0.57 *7*	1.50 *27*
	High (>= pc 66)	1.80 *7*	1.49 *10*	1.97 *13*	1.77 *30*
	Total	1.44 *28*	1.38 *29*	1.02 *28*	1.28 *85*

Notes: The number of countries is in italics. The definitions of the variables can be consulted in the Appendix I. The sample of countries is limited to the basic sample analyzed in cross-section regressions (Appendix III).

Table 2

Basic regressions

Dependent variable is growth	1 Basic regression	2 Low public sector quality	3 Middle public sector quality	4 High public sector quality	5 Interaction model	6 Reference model
Ln GDP pc (initial year)	-0.815*** (0.23)	-0.157 (0.33)	-1.186*** (0.29)	-0.257 (0.47)	-0.821*** (0.22)	-0.81*** (0.24)
Secondary school enrollment	0.03*** (0.01)	0.011 (0.01)	0.054*** (0.01)	0.03 (0.02)	0.028*** (0.01)	0.029*** (0.01)
Gross fixed capital formation	0.176*** (0.05)	0.185** (0.07)	0.251*** (0.08)	0.186** (0.07)	0.201*** (0.05)	0.22*** (0.05)
Government size	-0.123*** (0.03)	-0.16*** (0.05)	-0.112 (0.08)	-0.064 (0.06)	-0.261*** (0.06)	
Bureaucracy quality	0.937*** (0.19)				0.044 (0.43)	
Gov.size x Bur. quality					0.057** (0.02)	
Government size (initial year)						-0.113*** (0.03)
Bureaucracy quality (initial year)						-0.223 (0.30)
Gov.size x Bur. quality (initial year)						0.041*** (0.01)
R-squared	0.58	0.43	0.69	0.48	0.6	0.52
Number of observations	85	28	27	30	85	85

Notes: The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with OLS. The definitions of the variables can be found in Appendix I. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% levels, respectively. The criteria to classify countries in columns 3-5 is the same as in table 1. The sample of countries is limited to the basic sample analyzed in cross-section regressions (Appendix III).

Table 3a

Robustness checks: control variables and outliers

Dependent variable is growth	1 Reference model	2	3	4	5	6	7	8	9	10	11	12 Leverage	13 Standardized residuals	14 Studentized Residuals	15 Cook's D	16 DFITS
Ln GDP pc (initial year)	-0.81***	-0.801***	-0.686***	-1.366***	-0.798***	-0.871***	-0.816***	-0.836***	-0.872***	-0.486**	-0.865***	-0.45**	-0.686***	-0.677***	-0.403**	-0.455**
	(0.24)	(0.23)	(0.26)	(0.21)	(0.25)	(0.2)	(0.23)	(0.24)	(0.21)	(0.21)	(0.23)	(0.22)	(0.22)	(0.22)	(0.19)	(0.19)
Secondary school enrollment	0.029***	0.029***	0.026**	0.011	0.031***	0.019**	0.028***	0.03***	0.02***	0.018**	0.022***	0.021**	0.027***	0.027***	0.018**	0.021***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Gross fixed capital formation	0.22***	0.222***	0.222***	0.132***	0.216***	0.243***	0.218***	0.216***	0.21***	0.253***	0.225***	0.189***	0.169***	0.18***	0.186***	0.185***
	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Government size (initial year)	-0.113***	-0.111***	-0.115***	-0.068*	-0.114***	-0.086***	-0.116***	-0.114***	-0.085***	-0.093**	-0.102***	-0.113**	-0.123***	-0.119***	-0.132***	-0.132***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
Bureaucracy quality (initial year)	-0.223	-0.215	-0.338	0.066	-0.35	-0.191	-0.373	-0.226	-0.078	-0.154	-0.156	-0.071	-0.299	-0.269	-0.283	-0.265
	(0.3)	(0.3)	(0.3)	(0.29)	(0.28)	(0.24)	(0.28)	(0.3)	(0.29)	(0.27)	(0.29)	(0.3)	(0.3)	(0.3)	(0.27)	(0.27)
Gov.size x Bur. quality (initial year)	0.041***	0.04***	0.042***	0.028*	0.046***	0.032**	0.051***	0.04***	0.025*	0.03**	0.029**	0.027*	0.041***	0.039***	0.036***	0.036***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Control variables		Trade	Ln (1+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	OCDE dummy					
		-0.001	-0.093	0.177***	0.286	0.197***	[0.37]	0.443	3.666***	-0.065***	1.29***					
		(0.01)	(0.17)	(0.03)	(0.17)	(0.05)		(0.41)	(0.97)	(0.01)	(0.48)					
R-squared	0.52	0.52	0.53	0.66	0.54	0.61	0.55	0.53	0.6	0.62	0.56	0.44	0.47	0.5	0.52	0.52
Number of observations	85	85	83	85	84	82	84	85	84	85	85	77	82	81	78	77

Notes: Outliers in column 12 are United Arab Emirates, Brunei, China, Guyana, Israel, Liberia, Papau N. G. and Zambia. Outliers in column 13 are China, Congo (Dem.Rep.) and Ireland. Outliers in column 14 are China, Congo (Dem.Rep.), Ireland and Sudam. Outliers in column 15 are United Arab Emirates, Brunei, China, Congo (Dem.Rep.), Gabon, Hong Kong and Israel. Outliers in column 16 are United Arab Emirates, Australia, Brunei, China, Congo (Dem.Rep.), Gabon, Hong Kong and Israel. See footnote to Table 2 for the rest.

Table 3b

Marginal effects of government size on growth depending on public sector quality: Bureaucratic quality

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Dependent variable is growth																
Bureaucracy quality = 0	-0.11***	-0.11***	-0.12***	-0.07*	-0.11***	-0.09***	-0.12***	-0.11***	-0.09***	-0.09**	-0.1***	-0.11**	-0.12***	-0.12***	-0.13***	-0.13***
	(0.034)	(0.036)	(0.034)	(0.038)	(0.033)	(0.032)	(0.034)	(0.035)	(0.032)	(0.035)	(0.032)	(0.043)	(0.031)	(0.03)	(0.031)	(0.031)
Bureaucracy quality = 1	-0.07***	-0.07**	-0.07***	-0.04	-0.07***	-0.05**	-0.07**	-0.07***	-0.06**	-0.06**	-0.07***	-0.09***	-0.08***	-0.08***	-0.1***	-0.1***
	(0.025)	(0.028)	(0.026)	(0.027)	(0.025)	(0.023)	(0.026)	(0.027)	(0.025)	(0.025)	(0.024)	(0.031)	(0.023)	(0.023)	(0.022)	(0.022)
Bureaucracy quality = 2	-0.03	-0.03	-0.03	-0.01	-0.02	-0.02	-0.02	-0.03	-0.04	-0.03*	-0.04**	-0.06**	-0.04*	-0.04*	-0.06***	-0.06***
	(0.024)	(0.027)	(0.025)	(0.021)	(0.022)	(0.02)	(0.023)	(0.025)	(0.024)	(0.02)	(0.022)	(0.024)	(0.023)	(0.023)	(0.019)	(0.019)
Bureaucracy quality = 3	0.01	0.01	0.01	0.01	0.02	0.01	0.04	0.01	-0.01	0	-0.02	-0.03	0	0	-0.02	-0.02
	(0.031)	(0.032)	(0.033)	(0.025)	(0.026)	(0.024)	(0.029)	(0.031)	(0.029)	(0.022)	(0.028)	(0.026)	(0.031)	(0.031)	(0.023)	(0.023)
Bureaucracy quality = 4	0.05	0.05	0.05	0.04	0.07*	0.04	0.09**	0.04	0.01	0.03	0.01	0	0.04	0.04	0.01	0.01
	(0.042)	(0.042)	(0.045)	(0.035)	(0.036)	(0.032)	(0.038)	(0.042)	(0.039)	(0.031)	(0.039)	(0.036)	(0.042)	(0.042)	(0.031)	(0.031)

Notes: The estimations correspond to the regressions in Table 3a. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively.

Table 4a

Robustness checks: Executive constraints

Dependent variable is growth	1 Reference model	2	3	4	5	6	7	8	9	10	11	12 Leverage	13 Standardized residuals	14 Studentized Residuals	15 Cook's D	16 DFITS
Ln GDP pc (initial year)	-0.791***	-0.772***	-0.817***	-1.134***	-0.761***	-0.781***	-0.768***	-0.841***	-0.865***	-0.56***	-0.861***	-0.519**	-0.674***		-0.472***	
	(0.21)	(0.2)	(0.24)	(0.2)	(0.24)	(0.2)	(0.22)	(0.21)	(0.18)	(0.2)	(0.21)	(0.2)	(0.18)		(0.17)	
Secondary school enrollment	0.029***	0.029***	0.028***	0.016**	0.028***	0.022**	0.029***	0.029***	0.017***	0.021***	0.023***	0.023**	0.026***		0.022***	
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)		(0.01)	
Gross fixed capital formation	0.229***	0.236***	0.207***	0.166***	0.229***	0.246***	0.21***	0.223***	0.223***	0.252***	0.229***	0.209***	0.174***		0.201***	
	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)		(0.04)	
Government size (initial year)	-0.135***	-0.124***	-0.149***	-0.099**	-0.134***	-0.112***	-0.137***	-0.139***	-0.112***	-0.119***	-0.125***	-0.151***	-0.144***		-0.162***	
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.05)	(0.03)		(0.03)	
Executive constraints (initial year)	-0.135	-0.138	-0.159	-0.113	-0.148	-0.234	-0.101	-0.147	-0.009	-0.152	-0.12	-0.206	-0.174		-0.245*	
	(0.14)	(0.14)	(0.13)	(0.14)	(0.14)	(0.15)	(0.15)	(0.14)	(0.13)	(0.14)	(0.13)	(0.19)	(0.13)		(0.14)	
Gov.size x Ex. constraints (initial year)	0.024***	0.024***	0.026***	0.02***	0.024***	0.022***	0.025***	0.025***	0.017***	0.021***	0.02***	0.027**	0.024***		0.027***	
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)		(0.01)	
Control variables		Trade	Ln (1+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	OCDE dummy					
		-0.004	-0.277**	0.133***	0.13	0.152*	[0.366]	0.549	3.863***	-0.049***	1.068**					
		(0.01)	(0.13)	(0.03)	(0.19)	(0.09)		(0.4)	(0.9)	(0.01)	(0.46)					
R-squared	0.58	0.58	0.61	0.66	0.58	0.6	0.59	0.59	0.65	0.62	0.6	0.54	0.55		0.55	
Number of observations	82	82	80	82	82	82	82	82	82	82	82	76	79		76	

Notes: Outliers in column 12 are United Arab Emirates, China, Guyana, Israel, Jordan and Zambia. Outliers in columns 13 and 14 are China, Congo (Dem.Rep.) and Ireland. Outliers in columns 15 and 16 are United Arab Emirates, Australia, China, Congo (Dem.Rep.), Gabon and Zambia. The sample of countries is limited to the basic sample of cross-section regressions (Appendix III). See footnote to Table 2 for the rest.

Table 4b

Marginal effects of government size on growth depending on public sector quality: Executive constraints

Dependent variable is growth	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Executive constraints = 1	-0.11***	-0.1***	-0.12***	-0.08**	-0.11***	-0.09***	-0.11***	-0.11***	-0.1***	-0.1***	-0.1***	-0.12***	-0.12***		-0.14***	
	(0.031)	(0.032)	(0.033)	(0.033)	(0.03)	(0.033)	(0.031)	(0.031)	(0.025)	(0.031)	(0.029)	(0.045)	(0.028)		(0.029)	
Executive constraints = 2	-0.09***	-0.08***	-0.1***	-0.06**	-0.09***	-0.07**	-0.09***	-0.09***	-0.08***	-0.08***	-0.08***	-0.1***	-0.1***		-0.11***	
	(0.025)	(0.027)	(0.027)	(0.027)	(0.025)	(0.027)	(0.026)	(0.025)	(0.021)	(0.025)	(0.024)	(0.036)	(0.023)		(0.023)	
Executive constraints = 3	-0.06***	-0.05**	-0.07***	-0.04*	-0.06***	-0.05**	-0.06***	-0.06***	-0.06***	-0.06***	-0.06***	-0.07**	-0.07***		-0.08***	
	(0.02)	(0.023)	(0.021)	(0.022)	(0.02)	(0.022)	(0.022)	(0.02)	(0.017)	(0.02)	(0.019)	(0.028)	(0.018)		(0.019)	
Executive constraints = 4	-0.04**	-0.03	-0.05***	-0.02	-0.04**	-0.03	-0.04*	-0.04**	-0.05***	-0.03**	-0.04***	-0.04**	-0.05***		-0.05***	
	(0.017)	(0.02)	(0.017)	(0.018)	(0.017)	(0.018)	(0.02)	(0.016)	(0.015)	(0.017)	(0.016)	(0.022)	(0.014)		(0.015)	
Executive constraints = 5	-0.01	-0.01	-0.02	0	-0.01	0	-0.01	-0.01	-0.03*	-0.01	-0.02	-0.02	-0.02*		-0.03*	
	(0.015)	(0.019)	(0.015)	(0.016)	(0.016)	(0.017)	(0.021)	(0.015)	(0.015)	(0.016)	(0.015)	(0.021)	(0.013)		(0.014)	
Executive constraints = 6	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.01	-0.01	0.01	0	0.01	0		0	
	(0.017)	(0.02)	(0.016)	(0.018)	(0.018)	(0.018)	(0.024)	(0.016)	(0.018)	(0.018)	(0.017)	(0.024)	(0.014)		(0.016)	
Executive constraints = 7	0.04*	0.04*	0.03	0.04*	0.04*	0.04*	0.04	0.03*	0	0.03	0.02	0.04	0.03		0.03	
	(0.021)	(0.023)	(0.019)	(0.021)	(0.022)	(0.022)	(0.029)	(0.02)	(0.022)	(0.022)	(0.02)	(0.031)	(0.017)		(0.02)	

Notes: The estimations correspond to regressions in Table 4 a. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively.

Table 5a

2SLS regressions

Dependent variable is growth	1 Reference model	2	3	4	5	6	7	8	9	10	11	12 Leverage	13 Standardized residuals	14 Studentized Residuals	15 Cook's D	16 DFITS
Ln GDP pc (initial year)	-0.823***	-0.813***	-0.78***	-1.474***	-0.824***	-0.893***	-0.844***	-0.824***	-0.903***	-0.66***	-0.898***	-0.678***	-0.66***	-0.611***	-0.585***	
	(0.23)	(0.22)	(0.25)	(0.23)	(0.25)	(0.2)	(0.25)	(0.22)	(0.19)	(0.22)	(0.23)	(0.24)	(0.2)	(0.2)	(0.19)	
Secondary school enrollment	0.026**	0.026***	0.024**	0.003	0.028***	0.017**	0.026**	0.028***	0.018**	0.015*	0.022**	0.021**	0.02**	0.016*	0.015**	
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Gross fixed capital formation	0.22***	0.22***	0.211***	0.122**	0.217***	0.23***	0.224***	0.212***	0.21***	0.241***	0.222***	0.181***	0.188***	0.186***	0.178***	
	(0.06)	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)	(0.05)	(0.04)	(0.03)	(0.04)	
Government size	-0.257***	-0.251**	-0.248***	-0.198**	-0.252***	-0.222**	-0.284**	-0.223**	-0.242**	-0.258***	-0.302***	-0.226**	-0.324***	-0.341***	-0.291***	
	(0.09)	(0.1)	(0.09)	(0.09)	(0.09)	(0.09)	(0.11)	(0.1)	(0.1)	(0.1)	(0.09)	(0.1)	(0.08)	(0.08)	(0.09)	
Bureaucracy quality	-0.455	-0.46	-0.413	0.308	-0.595	-0.249	-0.923	-0.333	-0.311	-0.286	-0.488	-0.072	-0.704	-0.524	-0.063	
	(0.76)	(0.72)	(0.77)	(0.76)	(0.76)	(0.73)	(0.69)	(0.77)	(0.71)	(0.78)	(0.81)	(0.67)	(0.66)	(0.67)	(0.73)	
Gov.size x Bur. quality	0.078**	0.076**	0.074**	0.06*	0.081**	0.066**	0.103***	0.063*	0.067*	0.076**	0.091***	0.061*	0.093***	0.092***	0.071**	
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	
Control variables		Trade	Ln (1+ inflation)	Life expectancy	Number of conflicts	Institution. democracy	Religion (p-value)	Never a colony	Latitude	Natural resources	OCDE dummy					
		0.00	-0.137	0.167***	0.177	0.141**	[0.444]	0.517	3.138***	-0.048***	0.33					
		(0.01)	(0.15)	(0.04)	(0.18)	(0.06)		(0.43)	(1.09)	(0.02)	(0.80)					
Underidentification test	0.00	0.02	0.00	0.00	0.00	0.04	0.14	0.00	0.01	0.03	0.01	0.00	0.00	0.01	0.07	
Hansen J statistic	0.60	0.57	0.62	0.46	0.57	0.51	0.23	0.55	0.19	0.37	0.48	0.68	0.59	0.53	0.46	
Centered R-squared	0.58	0.58	0.59	0.69	0.59	0.64	0.58	0.6	0.66	0.64	0.59	0.51	0.63	0.67	0.67	
Number of observations	85	85	83	85	84	82	84	85	84	85	85	79	80	79	78	

Notes : The variables represent the average over the period 1981-2005, unless stated otherwise. The estimations include a constant term, which is omitted for space considerations. All regressions are estimated with 2SLS. The endogenous variables are Government size, Bureaucracy Quality and Gov.size x Bur. Quality, and the instrument are Government size in 1981, legal origin, and Gov.size in 1981 x legal origin. Small sample correction is applied. The definitions of the variables can be found in Appendix I. Robust standard errors appear in parentheses.*, ** and *** denote significance at the 10, 5 and 1% level, respectively. Outliers in column 12 are United Arab Emirates, Bangladesh, China, Guyana, Israel and Liberia. Outliers in column 13 are China, Congo (Dem.Rep.), Gabon, Ireland and Panama. Outliers in column 14 are Brunei, China, Congo (Dem.Rep.), Gabon, Ireland and Panama. Outliers in columns 15 and 16 are United Arab Emirates, Australia, Brunei, China, Congo (Dem.Rep.), Gabon and Panama. The sample of countries is limited to the basic sample analyzed in cross-section regressions (Appendix III).

Table 5b

2SLS regressions. Marginal effects of government size

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Dependent variable is growth																
Bureaucracy quality = 0	-0.26***	-0.25**	-0.25***	-0.2**	-0.25***	-0.22**	-0.28**	-0.22**	-0.24**	-0.26***	-0.3***	-0.23**	-0.32***	-0.34***	-0.29***	
	(0.091)	(0.102)	(0.091)	(0.093)	(0.093)	(0.086)	(0.108)	(0.097)	(0.098)	(0.096)	(0.092)	(0.101)	(0.078)	(0.079)	(0.086)	
Bureaucracy quality = 1	-0.18***	-0.18**	-0.17***	-0.14**	-0.17**	-0.16**	-0.18**	-0.16**	-0.18**	-0.18***	-0.21***	-0.16**	-0.23***	-0.25***	-0.22***	
	(0.065)	(0.076)	(0.065)	(0.065)	(0.065)	(0.059)	(0.079)	(0.069)	(0.066)	(0.064)	(0.062)	(0.074)	(0.055)	(0.052)	(0.055)	
Bureaucracy quality = 2	-0.1**	-0.1*	-0.1**	-0.08*	-0.09**	-0.09**	-0.08	-0.1**	-0.11***	-0.11***	-0.12***	-0.1*	-0.14***	-0.16***	-0.15***	
	(0.045)	(0.055)	(0.046)	(0.043)	(0.044)	(0.038)	(0.055)	(0.046)	(0.04)	(0.039)	(0.039)	(0.052)	(0.037)	(0.031)	(0.031)	
Bureaucracy quality = 3	-0.02	-0.02	-0.03	-0.02	-0.01	-0.02	0.03	-0.03	-0.04	-0.03	-0.03	-0.04	-0.04	-0.07**	-0.08**	
	(0.042)	(0.047)	(0.044)	(0.04)	(0.041)	(0.037)	(0.044)	(0.041)	(0.037)	(0.039)	(0.037)	(0.045)	(0.035)	(0.031)	(0.034)	
Bureaucracy quality = 4	0.06	0.05	0.05	0.04	0.07	0.04	0.13**	0.03	0.03	0.04	0.06	0.02	0.05	0.03	-0.01	
	(0.059)	(0.058)	(0.061)	(0.058)	(0.058)	(0.058)	(0.053)	(0.058)	(0.061)	(0.064)	(0.06)	(0.057)	(0.051)	(0.051)	(0.06)	

Notes: The estimations correspond to regressions in Table 5a. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively.

Table 6a

System GMM estimator: Bureaucracy quality

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8
Dependent variable is growth	Reference model							Drop OECD
Ln GDP pc $_{t-1}$	-1.235***	-1.504***	-1.146***	-1.337***	-1.357***	-1.465***	-1.369***	-1.01**
	(0.37)	(0.35)	(0.35)	(0.36)	(0.36)	(0.38)	(0.37)	(0.41)
Secondary school enrollment	0.07***	0.086***	0.07***	0.047**	0.071***	0.077***	0.06***	0.063***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Gross fixed capital formation	0.151**	0.224***	0.164***	0.158**	0.158**	0.145**	0.154**	0.168**
	(0.07)	(0.06)	(0.06)	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)
Government size	-0.364***	-0.381***	-0.367***	-0.315***	-0.347***	-0.368***	-0.253**	-0.375***
	(0.11)	(0.12)	(0.11)	(0.11)	(0.12)	(0.11)	(0.11)	(0.12)
Bureaucracy quality	-0.551	-0.953	-0.974	-0.612	-0.377	-0.293	-0.437	-0.953
	(0.76)	(0.67)	(0.73)	(0.72)	(0.76)	(0.72)	(0.72)	(0.87)
Gov.size x Bur. quality	0.078**	0.075*	0.09**	0.081**	0.071*	0.075*	0.063*	0.117**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)
Control variables		Ln (1+ inflation)	Trade	Life expectancy	Number of conflicts	Natural resources	Institution. democracy	
		-0.831***	-0.001	0.082	-0.348	0.013	0.127	
		(0.25)	(0.01)	(0.06)	(0.31)	(0.02)	(0.09)	
Number of observations	450	414	450	450	446	446	418	335
Arellano-Bond test for AR(2)	0.33	0.19	0.29	0.33	0.35	0.49	0.24	0.93
Hansen test of overid.	0.17	0.11	0.28	0.27	0.20	0.14	0.22	0.38

Notes: The variables are averages over the 5-year intervals during the period 1981-2005. The coefficients on the period dummies are not reported for space considerations. The definitions of the variables can be found in the Appendix I. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively. All regressions are estimated with the one-step *System GMM estimator* using the STATA program xtabond2 (Roodman, 2006). Small sample correction is applied. For the first difference equation, second and previous lags of endogenous variables and first and previous lags of predetermined variables are used as instruments. For the level equation, lag first difference of endogenous variables and first difference of predetermined variables are used as instruments. The excluded instruments are population dependency ratio and legal origin, and the exogenous variables are the period dummies. The endogenous variables are gross fixed capital formation, government size and gov. size x bureaucracy quality, while the remaining variables are predetermined.

Table 6b

System GMM estimator. Marginal effects of government size

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8
Dependent variable is growth								
Bureaucracy quality = 0	-0.36***	-0.38***	-0.37***	-0.31***	-0.35***	-0.37***	-0.25**	-0.38***
	(0.114)	(0.116)	(0.114)	(0.114)	(0.116)	(0.109)	(0.109)	(0.117)
Bureaucracy quality = 1	-0.29***	-0.31***	-0.28***	-0.23***	-0.28***	-0.29***	-0.19**	-0.26***
	(0.084)	(0.085)	(0.083)	(0.086)	(0.084)	(0.078)	(0.082)	(0.075)
Bureaucracy quality = 2	-0.21***	-0.23***	-0.19***	-0.15**	-0.2***	-0.22***	-0.13*	-0.14**
	(0.064)	(0.062)	(0.06)	(0.066)	(0.062)	(0.056)	(0.065)	(0.061)
Bureaucracy quality = 3	-0.13**	-0.15**	-0.1	-0.07	-0.13**	-0.14**	-0.06	-0.03
	(0.062)	(0.06)	(0.059)	(0.063)	(0.06)	(0.057)	(0.066)	(0.088)
Bureaucracy quality = 4	-0.05	-0.08	-0.01	0.01	-0.06	-0.07	0	0.09
	(0.08)	(0.08)	(0.079)	(0.078)	(0.08)	(0.079)	(0.085)	(0.133)

Notes: The estimations correspond to regressions in Table 6a. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively.

Table 7a

System GMM estimator : Executive constraints

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8
Dependent variable is growth	Reference model							Drop OECD
Ln GDP pc $_{t-1}$	0.161	-1.321***	0.25	-0.126	0.139	-0.31	0.352	0.489
	(0.43)	(0.49)	(0.42)	(0.44)	(0.38)	(0.45)	(0.41)	(0.44)
Secondary school enrollment	-0.011	0.05**	-0.016	-0.045*	-0.011	-0.006	-0.012	-0.016
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Gross fixed capital formation	0.304***	0.308***	0.266***	0.275**	0.32***	0.267***	0.324***	0.353***
	(0.1)	(0.1)	(0.08)	(0.12)	(0.09)	(0.08)	(0.09)	(0.09)
Government size	-0.643***	-0.717***	-0.506***	-0.598***	-0.624***	-0.633***	-0.636***	-0.569**
	(0.23)	(0.19)	(0.15)	(0.21)	(0.21)	(0.21)	(0.2)	(0.24)
Executive constraints	-1.144*	-1.073	-0.794	-1.303**	-1.074	-0.631	-1.183	-0.859
	(0.68)	(0.65)	(0.51)	(0.63)	(0.65)	(0.6)	(0.73)	(0.79)
Gov.size x Ex. constrainst	0.098**	0.089**	0.075**	0.106***	0.092**	0.096**	0.093**	0.067
	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)
Control variables		Ln (1+ inflation)	Trade	Life expectancy	Number of conflicts	Natural resources	Institution. democracy	
		-1.976***	0.008	0.15**	-0.17	0.092***	-0.055	
		(0.33)	(0.01)	(0.07)	(0.44)	(0.03)	(0.33)	
Number of observations	505	458	505	505	505	500	505	396
Arellano-Bond test for AR(2)	0.303	0.749	0.322	0.199	0.263	0.114	0.348	0.312
Hansen test of overid.	0.105	0.136	0.11	0.217	0.253	0.14	0.19	0.039

Notes : The endogenous variables are gross fixed capital formation, government size and gov. size x executive constraints, while the remaining variables are predetermined. See footnote to Table 6a for the rest.

Table 7b

System GMM estimator . Marginal effects of government size

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8
Dependent variable is growth								
Executive constraints = 1	-0.54***	-0.63***	-0.43***	-0.49***	-0.53***	-0.54***	-0.54***	-0.5**
	(0.195)	(0.163)	(0.129)	(0.176)	(0.177)	(0.176)	(0.167)	(0.195)
Executive constraints = 2	-0.45***	-0.54***	-0.36***	-0.39**	-0.44***	-0.44***	-0.45***	-0.44***
	(0.161)	(0.133)	(0.107)	(0.15)	(0.144)	(0.145)	(0.136)	(0.155)
Executive constraints = 3	-0.35***	-0.45***	-0.28***	-0.28**	-0.35***	-0.34***	-0.36***	-0.37***
	(0.13)	(0.106)	(0.09)	(0.128)	(0.115)	(0.117)	(0.11)	(0.122)
Executive constraints = 4	-0.25**	-0.36***	-0.2**	-0.17	-0.26***	-0.25**	-0.26***	-0.3***
	(0.106)	(0.086)	(0.081)	(0.114)	(0.093)	(0.097)	(0.091)	(0.101)
Executive constraints = 5	-0.15	-0.27***	-0.13	-0.07	-0.16*	-0.15*	-0.17**	-0.23**
	(0.095)	(0.076)	(0.084)	(0.111)	(0.086)	(0.09)	(0.085)	(0.102)
Executive constraints = 6	-0.06	-0.18**	-0.05	0.04	-0.07	-0.06	-0.08	-0.17
	(0.101)	(0.081)	(0.097)	(0.119)	(0.095)	(0.097)	(0.094)	(0.124)
Executive constraints = 7	0.04	-0.09	0.02	0.15	0.02	0.04	0.02	-0.1
	(0.121)	(0.1)	(0.117)	(0.137)	(0.117)	(0.117)	(0.115)	(0.157)

Notes : The estimations correspond to regressions in Table 7a. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively.

Table 8a

System GMM estimator: Other specifications

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8	9	10
Dependent variable is growth	Reference model	Excluded instr. Legal origin	Excluded instr. Dep. population	No excluded instrument	Orthogonal deviations	Orthog. dev. & no excl.instr.	Limited to lag (1 2)	Limited to lag (1 2) & no excl.	Two step estimator	Two step est. & no excl. instr.
Ln GDP pc $_{t-1}$	-1.235***	-1.146***	-1.072**	-0.764	-1.185***	-0.696	-1.277***	-0.839	-1.388***	-1.023*
	(0.37)	(0.4)	(0.45)	(0.5)	(0.36)	(0.48)	(0.38)	(0.51)	(0.44)	(0.61)
Secondary school enrollment	0.07***	0.072***	0.065***	0.074***	0.069***	0.073***	0.072***	0.078***	0.072***	0.078***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Gross fixed capital formation	0.151**	0.145**	0.158**	0.16**	0.16**	0.17**	0.151**	0.159**	0.159**	0.182**
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.09)
Government size	-0.364***	-0.357***	-0.512***	-0.49***	-0.352***	-0.453***	-0.394***	-0.543***	-0.384***	-0.458***
	(0.11)	(0.12)	(0.13)	(0.13)	(0.11)	(0.12)	(0.11)	(0.13)	(0.11)	(0.14)
Bureaucracy quality	-0.551	-0.485	-1.845*	-1.576	-0.583	-1.42	-0.625	-1.798*	-0.998	-1.589
	(0.76)	(0.78)	(0.97)	(0.99)	(0.75)	(0.95)	(0.78)	(1.01)	(0.76)	(1.03)
Gov.size x Bur. quality	0.078**	0.071*	0.156***	0.128**	0.075**	0.111**	0.085**	0.147**	0.096**	0.122**
	(0.04)	(0.04)	(0.06)	(0.06)	(0.04)	(0.06)	(0.04)	(0.06)	(0.04)	(0.06)
Number of observations	450	450	450	450	450	450	450	450	450	450
Arellano-Bond test for AR(2)	0.327	0.335	0.239	0.277	0.352	0.322	0.324	0.263	0.292	0.286
Hansen test of overid.	0.167	0.15	0.115	0.102	0.136	0.071	0.229	0.195	0.167	0.102

Notes: The variables are averages over the 5-year intervals during the period 1981-2005. The coefficients on the period dummies are not reported for space considerations. The definitions of the variables can be found in Appendix I. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively. All regressions are estimated with the *System GMM estimator* using the STATA program xtabond2 (Roodman, 2006). Small sample correction is applied. The reference regression corresponds to column 1 of Table 5a.

Table 8b

System GMM estimator. Marginal effects of government size

SYSTEM-GMM regressions	1	2	3	4	5	6	7	8	9	10
Dependent variable is growth										
Bureaucracy quality = 0	-0.36***	-0.36***	-0.51***	-0.49***	-0.35***	-0.45***	-0.39***	-0.54***	-0.38***	-0.46***
	(0.114)	(0.116)	(0.135)	(0.134)	(0.108)	(0.125)	(0.114)	(0.133)	(0.113)	(0.136)
Bureaucracy quality = 1	-0.29***	-0.29***	-0.36***	-0.36***	-0.28***	-0.34***	-0.31***	-0.4***	-0.29***	-0.34***
	(0.084)	(0.084)	(0.09)	(0.089)	(0.08)	(0.083)	(0.084)	(0.089)	(0.082)	(0.099)
Bureaucracy quality = 2	-0.21***	-0.22***	-0.2***	-0.23***	-0.2***	-0.23***	-0.22***	-0.25***	-0.19***	-0.21**
	(0.064)	(0.063)	(0.069)	(0.07)	(0.06)	(0.066)	(0.064)	(0.073)	(0.061)	(0.087)
Bureaucracy quality = 3	-0.13**	-0.15**	-0.04	-0.11	-0.13**	-0.12	-0.14**	-0.1	-0.09	-0.09
	(0.062)	(0.066)	(0.088)	(0.095)	(0.06)	(0.09)	(0.064)	(0.1)	(0.062)	(0.11)
Bureaucracy quality = 4	-0.05	-0.08	0.11	0.02	-0.05	-0.01	-0.05	0.04	0	0.03
	(0.08)	(0.09)	(0.131)	(0.142)	(0.079)	(0.134)	(0.084)	(0.149)	(0.083)	(0.152)

Notes: The estimations correspond to regressions in Table 8a. Robust standard errors are in parentheses. *, ** and *** denote significance at the 10, 5 and 1% level, respectively.

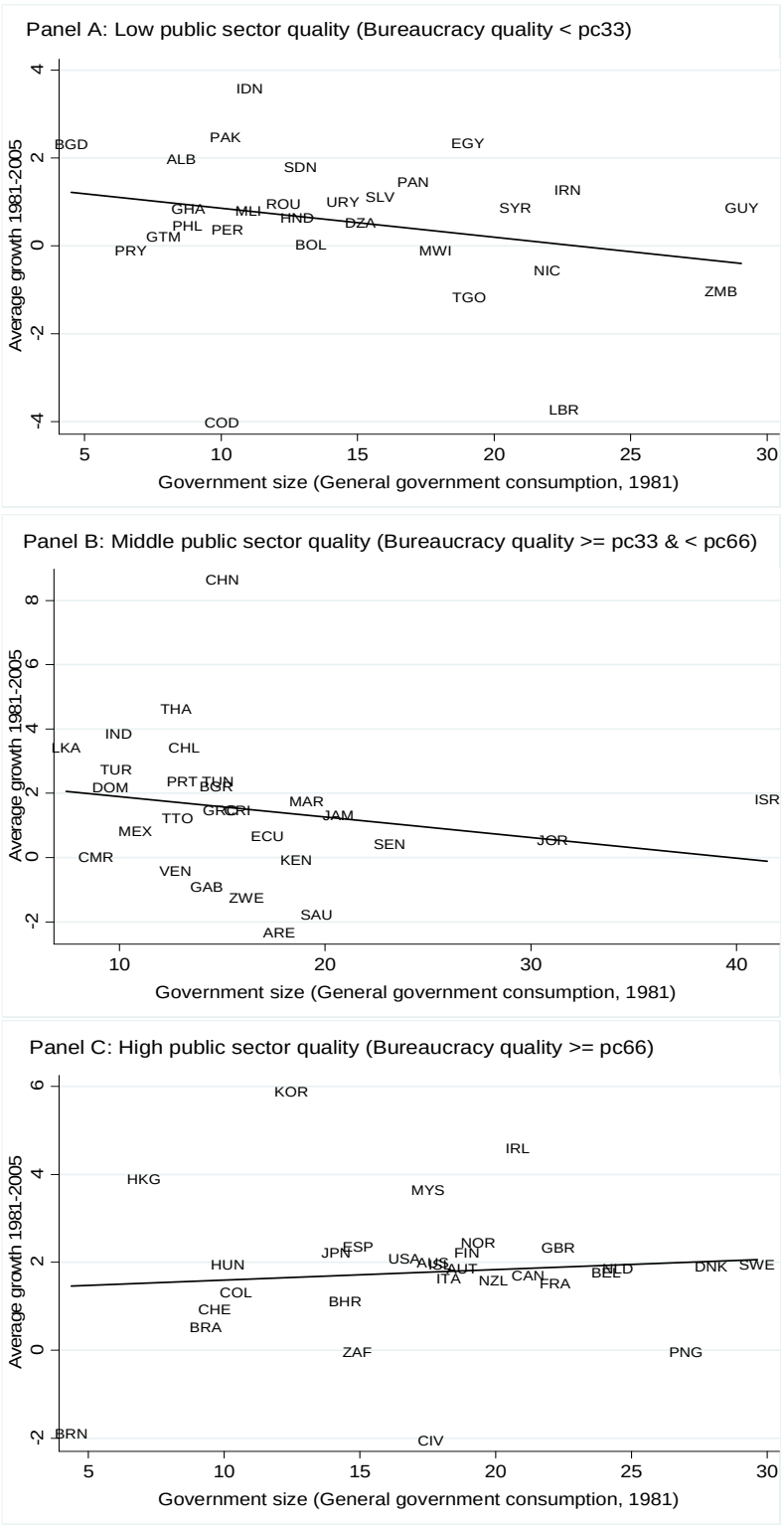

Figure 1. Government Size, Public Sector Quality and Growth

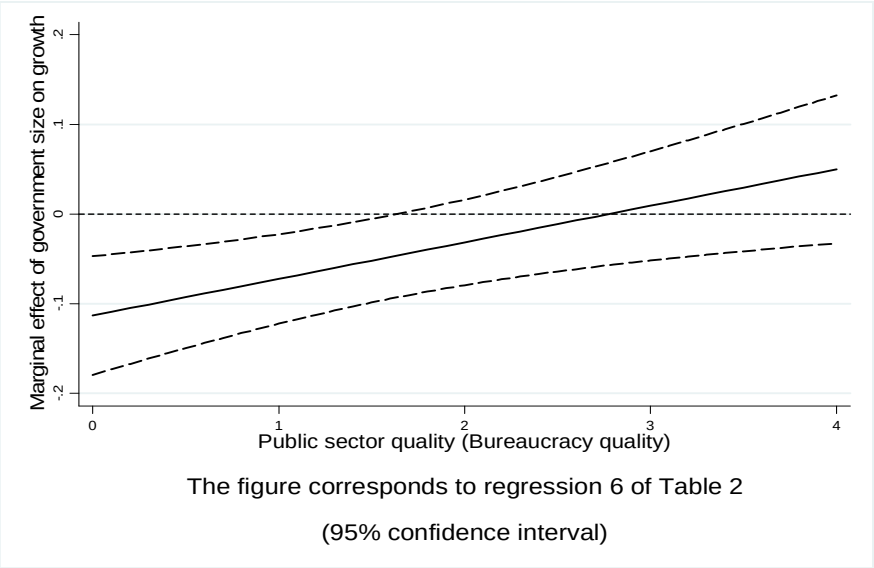

Figure 2. Marginal effect of government size on growth

APPENDIX I. DESCRIPTION OF VARIABLES

Variable	Description	Source
Bureaucracy quality	The institutional strength and quality of bureaucracy.	International Country Risk Guide (ICRG) (PRS Group).
Executive constraint	The extent of institutionalized constraints on the decision-making powers of chief executives. The scale ranges from 1 to 7, where a higher score means higher constraints.	Polity IV (Marshall et al. 2010), from Teorell et al. (2011).
Government size	General government final consumption expenditure (% of GDP).	World Development Indicators (WDI), 2011 (World Bank).
Gross fixed capital formation	Gross fixed capital formation (% of GDP).	WDI 2011 (World Bank).
Growth	Real GDP per capita growth (annual %).	WDI 2011 (World Bank).
Institutionalized democracy	The indicator measures the institutional degree of democracy. The scale ranges from 0 to 10, where a higher value indicates higher level of democracy.	Polity IV (Marshall et al. 2010), from Teorell et al. (2011).
Latitude	The absolute value of the latitude of the capital city, divided by 90 (to take values between 0 and 1).	La Porta et al.(1999), from Teorell et al. (2011).
Life expectancy	Life expectancy at birth, total (years).	WDI 2011 (World Bank).
Ln GDP pc	logarithm of real GDP per capita (constant 2000 US$).	WDI 2011 (World Bank).
Ln (1+ inflation)	Inflation, consumer prices (annual %).	WDI 2011 (World Bank).
Natural resources	The sum of rents from oil, gas and minerals over GDP.	WDI 2011 (World Bank).
Never a colony	The country has never been a colony.	Treisman (2007).
Number of conflicts	The number of armed conflicts in which the government of the country is involved.	UCDP/PRIO Armed Conflict Dataset (version 3-2005, Gleditsch et al. 2002), from Teorell et al. (2011).
OCDE dummy	Classification of countries by income.	WDI 2011 (World Bank).
Religion	Catholics, Muslims and Protestants as a percentage of population in 1980.	La Porta et al.(1999), from Teorell et al. (2011).
Secondary school	School enrolment, secondary (% gross).	WDI 2011 (World Bank).
Trade	Trade (% of GDP).	WDI 2011 (World Bank).

APPENDIX II. DESCRIPTIVE STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
Bureaucracy quality	85	2.33	1.11	0	4
Bureaucracy quality, 1984	85	2.07	1.40	0	4
Catholics, 1980	84	35.85	38.70	0	96.90
Executive constraint	82	4.84	1.94	1	7
Executive constraint, 1981	79	3.86	2.51	1	7
Government size	85	15.46	5.17	4.60	30.41
Government size, 1981	85	16.14	6.55	4.38	41.48
Gross fixed capital formation	85	21.01	4.46	9.70	32.65
Growth	85	1.28	1.88	-4.03	8.63
Institutionalized Democracy	82	5.55	3.66	0	10
Latitude	84	0.29	0.20	0	0.72
Life expectancy at birth	85	67.92	8.82	43.75	79.45
Ln GDP pc	85	7.86	1.51	5.00	10.70
Ln (1+ inflation)	83	2.50	1.28	0.31	7.25
Muslims, 1980	84	22.14	35.99	0	99.40
Natural resources	85	6.22	10.17	0	46.41
Never a colony	85	0.21	0.41	0	1
Number of Conflicts	84	0.35	0.66	0	5.25
Protestants, 1980	84	14.43	23.88	0	97.80
Secondary school enrollment	85	67.93	30.47	11.33	149.54
Trade	85	71.16	39.16	19.48	258.83

Notes: The variables represent the average for the period 1981-2005, unless stated otherwise. The sample of countries is limited to the basic sample analyzed in cross-section regressions.

Appendix II.b. Percentiles of institutional variables

	Bureaucracy quality		Executive constraint	
Percentile	**1984**	**1984-2005**	**1981**	**1981-2005**
10	0.0	0.9	1.0	2.1
20	0.4	1.2	1.0	3.0
30	1.0	1.6	2.0	3.4
40	2.0	2.0	3.0	4.5
50	2.0	2.3	3.0	5.1
60	2.4	2.5	5.0	5.6
70	3.0	2.9	7.0	6.8
80	3.5	3.7	7.0	7.0
90	4.0	4.0	7.0	7.0

Notes: The sample of countries is limited to the basic sample of cross-section regressions.

APPENDIX III. SAMPLES

A) Basic sample of cross-section analysis:

Albania, United Arab Emirates, Australia, Austria, Belgium, Bangladesh, Bulgaria, Bahrain, Bolivia, Brazil, Brunei, Canada, Switzerland, Chile, China, Cote d'Ivoire, Cameroon, Congo (Dem. Rep.), Colombia, Costa Rica, Denmark, Dominican Republic, Algeria, Ecuador, Egypt (Arab Rep.), Spain, Finland, France, Gabon, United Kingdom, Ghana, Greece, Guatemala, Guyana, Hong Kong, Honduras, Hungary, Indonesia, India, Ireland, Iran (Islamic Rep.), Iceland, Israel, Italy, Jamaica, Jordan, Japan, Kenya, Korea (Rep.), Liberia, Sri Lanka, Morocco, Mexico, Mali, Malawi, Malaysia, Nicaragua, Netherlands, Norway, New Zealand, Pakistan, Panama, Peru, Philippines, Papua New Guinea, Portugal, Paraguay, Romania, Saudi Arabia, Sudan, Senegal, El Salvador, Sweden, Syrian (Arab Rep.), Togo, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay, United States, Venezuela (R.B.), South Africa, Zambia and Zimbabwe.

B) Additional countries in the panel data analysis:

Angola (BQ/ EX), Argentina (BQ/ EX), Armenia (BQ/ EX), Azerbaijan (BQ/ EX), Bahamas (BQ), Belarus (BQ/ EX), Benin (EX), Bhutan (EX), Botswana (BQ/ EX), Burkina Faso (BQ/ EX), Burundi (EX), Cambodia (EX), Central African Republic (EX), Chad (EX), Comoros (EX), Congo, Rep. (BQ/ EX), Croatia (BQ/ EX), Cuba (BQ/ EX), Cyprus (BQ/ EX), Czech Republic (BQ/ EX), Djibouti (EX), Equatorial Guinea (EX), Eritrea (EX), Estonia (BQ/ EX), Ethiopia (BQ/ EX), Fiji (EX), Gambia (BQ/ EX), Georgia (EX), Germany (BQ/ EX), Guinea (BQ/ EX), Guinea-Bissau (BQ/ EX), Kazakhstan (BQ/ EX), Kuwait (BQ/ EX), Kyrgyz Republic (EX), Lao PDR (EX), Latvia (BQ/ EX), Lebanon (BQ), Lesotho (EX), Libya (BQ/ EX), Lithuania (BQ/ EX), Luxembourg (BQ), Macedonia (EX), Madagascar (BQ/ EX), Malta (BQ), Mauritania (EX), Mauritius (EX), Moldova (BQ/ EX), Mongolia (BQ/ EX), Mozambique (BQ/ EX), Namibia (BQ/ EX), Nepal (EX), Niger (BQ/ EX), Oman (BQ/ EX), Poland (BQ/ EX), Qatar (BQ/ EX), Russian Federation (BQ/ EX), Rwanda (EX), Sierra Leone (BQ/ EX), Slovak Republic (BQ/ EX), Slovenia (BQ/ EX), Solomon Islands (EX), Suriname (BQ), Swaziland (EX), Tajikistan (EX), Tanzania (BQ/ EX), Uganda (BQ/ EX), Ukraine (BQ/ EX), Uzbekistan (EX), Vietnam (BQ/ EX) and Yemen (BQ/ EX).

BQ indicates that the country is included in the regressions with bureaucracy quality, and EX indicates that the country is included in the regressions with executive constraints.