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# Public spending and growth: the role of institutions <sup>\*</sup>

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## Abstract

This paper examines the role of institutions in the nexus between public spending and economic growth. Using a newly assembled dataset of 80 countries over the 1970-2010 period with disaggregated public spending, we show that only when institutions prompt governments to be accountable to the general public, does the capital component of public spending significantly promote growth, especially when financed by a fall in current spending or by increased revenues. Meanwhile, a rise in current spending does not show robust growth-promoting potential, regardless of the level of government accountability. Our interpretation of these findings is that, while capital spending inately has a larger growth-fostering effect than current spending, inefficiencies inherent in the former type of spending, caused by officeholders' rent-seeking behavior under unaccountable governments, mitigate its fostering effect.

**Keywords:** Public spending, Economic growth, Institutions **JEL:** O43, H50, O11

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# 1 Introduction

When do public policies have the desired outcomes? For example, suppose that the government's objectives are to raise citizens' education attainment and reduce their mortality rates. Then, would increased education and health spending always help achieve these objectives? [Rajkumar and Swaroop \(2008\)](#) suggest that it may not, showing that for those policies to work, they need to be accompanied by good governance, namely by a government that is accountable for its actions or a bureaucracy with a professional ethos. Further, suppose that the objective is to control inflation rates. Would policy reforms aimed at increasing central bank independence necessarily help achieve this objective? [Acemoglu et al. \(2008\)](#) suggest that it may not, arguing that whether the reform works or not depends on institutions. For example, if incumbent policymakers are unconstrained to pursue personal rents, they may not properly implement reforms which could jeopardize their own privilege, resulting in the failure of these reforms. <sup>1</sup> Thus, a general message appears to be that the state of institutions, through which authority in a country is exercised, is critical for policies to yield the desired outcomes.

Acknowledging this, the present paper investigates how institutions, particularly those which prompt a government to be accountable to the general public, may interact with the effects of public spending on economic growth, an economic outcome of major importance. One strong motivation behind this question lies in the lack of consensus in the literature regarding the growth effects of different spending components. In particular, although capital spending may be expected to enhance growth by accumulating public capital and thus promoting private firms' productivity, the empirical results offered thus far are not consistent even qualitatively. For example, while [Easterly and Rebelo \(1993\)](#) and [Gupta et al. \(2005\)](#) show that capital spending enhances growth, [Devarajan et al. \(1996\)](#) and [Ghosh and](#)

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<sup>1</sup>Further, they argue that political reform is unlikely to have a significant impact when the quality of political institutions is highest, because in such cases, there should not be much distortion in existing policies in the first place, leaving little room for the reform to have any impact. Thus, their overall finding is that the reform has a maximum impact when implemented in countries where the quality of institutions is intermediate.

Gregoriou (2008) argue that this spending has a retarding effect, particularly in developing countries. Additionally, the empirical evidence on growth effects of current spending also appear to be inconclusive. For instance, while Barro (2004) shows that this spending has negative and significant growth effects, Devarajan et al. (1996) find evidence of its growth-promoting effects in developing countries.<sup>2</sup>

However, considering the role of institutions in the nexus between public policies and growth entails a few challenges both in terms of data and estimation. One obvious difficulty is how to measure the extent to which institutions prompt governments to be accountable. To tackle this, we use different proxies for the level of constraints on political officeholders, assuming that unconstrained politicians tend to be unaccountable to the public. Specifically, these proxies are the measures of “constraints on executives”, as a proxy for existing constraints on politicians, and the degree of “democracy/autocracy”, as a wider measure reflecting citizens’ political participation, complemented by the index of “voice and accountability”, an aggregate of various elements relating to citizens’ participation in selecting governments, and the degree of “political checks/balances and electoral competition”, a measure of the constraints from oppositions.<sup>3</sup> The next challenge is that disaggregated fiscal data at a national level is scarce, particularly for developing countries. In order to overcome this difficulty, we assemble a dataset based on historical data reported to the IMF’s Government Financial Statistics (GFS) yearbook. In particular, reconciling two different methodologies present in GFS, the dataset offers *comparable* spending data series in both current and capital components, at the central government level over the 1970-2010 period. Together with the proxies for government accountability, the final dataset contains 80 countries from different income

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<sup>2</sup>Admittedly, a few important differences in these studies make it difficult to compare their results. For instance, regarding the definition of current (or consumption, in their terminology) spending, Barro (2004) excludes defence and education-related spending, while Devarajan et al. (1996) do not. In addition, while the former does not particularly specify its financing source, the latter specify it as a fall in capital spending. However, the difference in their results still implies the general lack of consensus on the growth effects of current spending.

<sup>3</sup>“Constraints on executives” and “democracy/autocracy” measures are from Polity IV, while “voice and accountability” and “political checks/balances and electoral competition” are from the Worldwide Governance Indicators (WGI) and the Database for Political Institutions (DPI), respectively. More precise variable information is given below.

levels. As for the estimation of possible interactions between the growth effects of public spending and accountability levels, there are a few concerns for endogeneity, including fiscal variables' association with business cycles. Facing this issue, we use 8-years non-overlapping averages, yielding 5 periods per country. Further, to tackle any other endogeneity issues, we use the Generalized Method of Moments (GMM) dynamic panel estimation approach developed by [Holtz-Eakin et al. \(1988\)](#), [Arellano and Bond \(1991\)](#), and [Blundell and Bond \(1998\)](#).

Our main findings are as follows. Only when institutions make governments accountable to the general public, does the capital component of public spending have substantial scope for growth promotion. Specifically, a rise in this spending component, financed through a reallocation from the current component or through a rise in total revenue, is robustly associated with higher growth, although the association becomes more fragile when capital spending is financed by a budget deficit. Meanwhile, a rise in current spending does not show robust growth-promoting effects for any financing source, regardless of the level of government accountability. We obtain these results after conducting various robustness checks, such as using restricted samples which exclude certain periods/countries, classifying countries' accountability levels in different ways, and removing possible outliers from the assembled public spending dataset. Our interpretation of these results is that while public capital spending tends to have a larger growth-promoting effect than current spending, its effect can be mitigated by inefficiencies caused by officeholders' rent-seeking behavior. Specifically, these inefficiencies may arise when unaccountable officeholders attempt to receive "commissions" by granting private enterprises public capital projects or try to increase re-election prospects by targeting narrowly-defined constituencies with, say, localized infrastructure spending.

Broadly, our results highlight the importance of the efficiency/quality of public spending rather than its quantity. In this regard, this study is related to several papers in the literature discussing the importance of the former. For instance, [Pritchett \(2000\)](#) emphasizes that not all actual accounting costs of public investment necessarily contribute to the creation of eco-

nominically valuable capital. Subsequently, [Dabla-Norris et al. \(2012\)](#) create a cross-country index of public investment efficiency for 71 countries, considering several aspects of investment management over the four different stages: project appraisal, selection, implementation and evaluation. While their index reflects the degree of inefficiency relating to governments' rent expropriation, its coverage appears to be wider, capturing also the inefficiency due to their pure inability to conduct an efficient investment management.<sup>4</sup> Further, [Tanzi and Davoodi \(1997\)](#) and [Keefer and Knack \(2007\)](#) find that the level of capital spending increases in the worsening of corruption and institutional quality, respectively.<sup>5</sup> This suggests the existence of politically-induced inefficiencies inherent in this type of spending. This study complements the above papers by directly addressing the role of institutions in the efficiency of public capital spending in the context of economic growth.

This paper is also closely linked to the literature on institutions and their long-run economic outcomes. In particular, since [Acemoglu et al. \(2001\)](#) showed the causal effect of the former on the latter, various papers examined this relation further. For example, [Acemoglu and Johnson \(2005\)](#), unbundling institutions into “property rights institutions”, which protect citizens against expropriation by the government and elites, and “contracting institutions”, which facilitate private contracts between citizens, show that the worsening of the former type of institutions has larger adverse effects on growth by discouraging private investment.<sup>6</sup> Given that the institutions we consider (i.e, the ones constraining governments' rent-seeking behavior) are essentially “property rights institutions”, our results propose a complementary channel through which this type of institutions affects growth, namely the

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<sup>4</sup>In fact, this type of distinction of the source of public policy inefficiency is considered by [Bandiera et al. \(2009\)](#), who define the “active” and “passive” waste of public policy as, respectively, a waste involving benefit for policy makers and one caused by simple inability, lack of incentives, or excessive bureaucracy. While they emphasize the particular importance of the latter as a source of waste in the case of Italy, this paper reminds the importance of the former.

<sup>5</sup>[Keefer and Knack \(2007\)](#) argue that what is correlated with the level of capital spending is institutions that limit government's rent seeking, such as competitive elections and political checks/balances, rather than the level of corruption.

<sup>6</sup>They explain this result by pointing out that while individuals often manage to mitigate the adverse effects of weak contracting institutions by altering the terms of their contracts, they find it difficult to mitigate states' expropriation in this way since the state is the ultimate arbiter of contracts.

efficiency of public capital spending.<sup>7</sup> In general, in this sense of providing a channel between institutions and long-run growth, our paper is also related to [Alfaro et al. \(2008\)](#), among others, who highlight the importance of foreign direct investment.

The rest of this paper is structured as follows. Section 2 describes the dataset. Section 3 discusses empirical specification and methodology. Section 4 presents and interprets the results. Finally, Section 5 concludes with policy implications.

## 2 The Dataset

We first provide a brief exposition of key variables, namely proxies for institutions affecting the degree of government accountability and the decomposed public spending. We then present summary statistics for the subsequent regression analyses.

### 2.1 Institutions

To select proxies for institutions affecting government accountability, we assume that political officeholders are less accountable when they are less constrained. Based on this assumption, our first main proxy is the measure of “executive constraints” (“constraints”, for short) from Polity IV, measuring the degree of institutionalized constraints on the decision making powers of chief executives.<sup>8</sup> Although these constraints are not the same as the ones on political officeholders, they are likely to be correlated. Our next proxy is the measure of “democracy/autocracy” (“democracy”, for short), also from Polity IV, reflecting not only the previous measure of “constraints” but also other democratic elements including the degree to which citizens’ political participation is guaranteed.<sup>9</sup> When citizens can freely

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<sup>7</sup>Strictly, since we focus on expropriation by government officials, and not by elites in general, the institutions of our focus are more restricted than what they mean by “property rights institutions”.

<sup>8</sup>The variable name in Polity IV is “XCONST”.

<sup>9</sup>Moreover, this measure, whose official name in Polity IV is “POLITY2”, reflects the competitiveness and openness of executive recruitment.



pursue alternative political preferences, it clearly puts constraints on politicians’ irresponsible behavior.

These two measures are complemented by the additional two proxies. The first is the measure of “voice and accountability” (“voice” , for short), from the World Governance Indicators (WGI). This variable aggregates various existing measures concerning citizens’ political participation and other elements promoting government accountability, including freedom of the press and the transparency of public policies. The next is a measure of “political checks and balances and electoral competition” (“ checks” , for short) from the Database of Political Institutions (DPI). We assume that proper checks from the fellow politicians and competitive elections also increase the officeholders’ accountability.<sup>10</sup>

When conducting regression analyses below, we classify countries by government accountability levels, based on the national average of each accountability proxy during the 1970-2010 period, for which disaggregated public spending data is assembled.<sup>11</sup> Specifically, Table 10 in Appendix A divides the 80 countries covered in the regression analyses into 40 countries with high- and low-levels of accountability.<sup>12</sup> As seen there, while those classifications roughly match across the proxies, the match is not always perfect, indicating that each proxy may capture different institutional aspects. Consistently, Table 1 shows that the respective correlation coefficients among the 80 national averages of proxies are not necessarily high. For example, the correlation between “ voice” and “checks” is relatively low (0.65), possibly reflecting the fact that the main sources of constraints on political officeholders are different between them: the former being citizens and the latter being fellow politicians.

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<sup>10</sup>This measure is recorded higher, for instance, when a larger number of parties form the government coalition in a parliamentary system, while it is recorded lowest when legislatures are not competitively elected. Its variable name in DPI is “checks” .

<sup>11</sup>Note, however, that while “constraints” and “democracy” are available for the full sample period (and “checks” is nearly so, available from 1975 onwards), “voice” becomes available only in 1996. Thus, by using this variable, we implicitly assume that it tends to be time-invariant.

<sup>12</sup>To ease the comparisons among different accountability proxies, we also focus on the countries for which all the proxies are available.

Table 1: Correlations among proxies for institutions

	Exe constraint	Democracy/autocracy	Voice and account	Pol checks/balances
Exe constraint	1			
Democracy/autocracy	0.97	1		
Voice and account	0.86	0.83	1	
Pol checks/balances	0.76	0.79	0.65	1

Notes: Based on 80 national averages of respective institutional proxies. All the proxies take higher values when respective institutional factors are of better quality.

## 2.2 Disaggregated public spending and other fiscal variables

Next, facing the limited availability of disaggregated public spending data in the cross-country context, we assemble a dataset based on the IMF’s Government Finance Statistics (GFS) yearbook. The key innovation of this dataset is to bridge major methodological changes in the GFS manual (GFSM) which happened from mid 1990s to early 2000s with the introduction of GFSM2001 replacing old GFSM1986. Specifically, referring to [Wickens \(2002\)](#), who details the methodological differences between the two manuals, we create *comparable* disaggregated public spending data series, consisting of current and capital components, at the central government level over the 1970-2010 period.<sup>13</sup> Appendix B presents a brief summary of the data assembling procedure. Further, responding to [Kneller et al. \(1999\)](#)’s point that measuring the growth effect of public spending requires explicit consideration of its financing source, the dataset also contains data on the total revenue and budgeted deficit, as a difference between total spending and revenue.

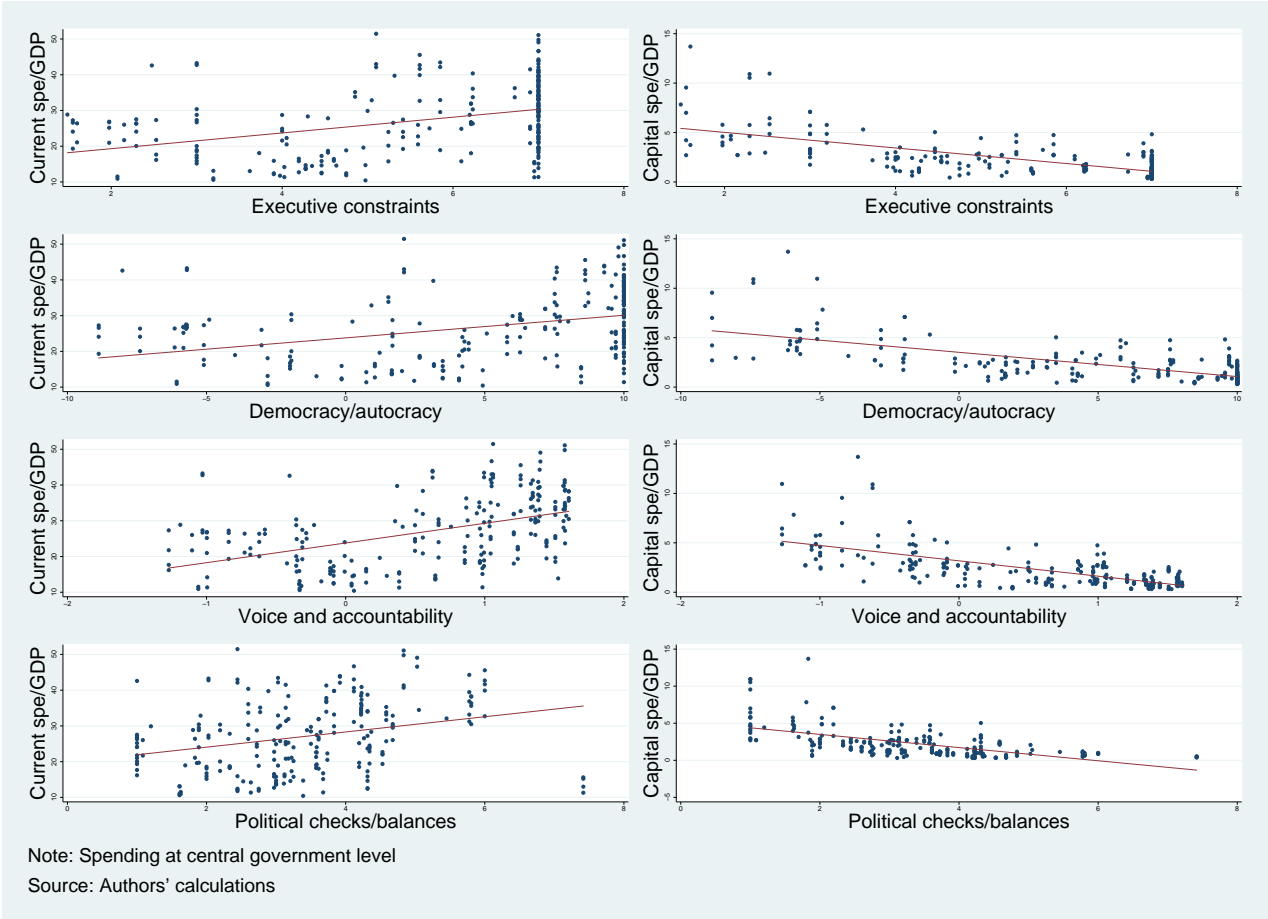
To shed light on the relation between institutions and the levels of different public spending components, Fig. 1 plots each different proxy discussed above against the shares of current and capital spending components to GDP.<sup>14</sup> Each data point in the figures represents the 8-year averages of each spending item covered in the subsequent regression analyses (the rationale for using the averages is clarified below) and the corresponding national average of the accountability level over the 1970-2010 period. Observe that, regardless of the proxies

<sup>13</sup>Previously, a somewhat similar disaggregated public spending dataset was assembled by [Acosta-Ormaechea and Morozumi \(2013\)](#).

<sup>14</sup>The GDP figure is from the World Economic Outlook.

used, the accountability level is positively associated with current spending, whereas it is negatively associated with capital spending.<sup>15</sup> One possible interpretation of these associations, similar to [Tanzi and Davoodi \(1997\)](#) and [Keefer and Knack \(2007\)](#), is that since public capital spending is generally a more convenient vehicle for rent seeking, unaccountable governments tend to increase capital, rather than current, spending to obtain rents. We will revisit these correlations when we interpret the regression results below.

Figure 1: Institutions and public spending



<sup>15</sup>Specifically, the coefficient of constraints (democracy, voice, checks) with current spending is 0.39 (0.36, 0.30 0.45), while that with capital spending is -0.68 (-0.69, -0.66, -0.61)

## 2.3 Summary statistics

To consider the role of institutions in the nexus between public spending and growth, we below conduct panel regression analyses. As mentioned, our reference specification adopts 8-year non-overlapping averages, creating a maximum of 5 observations per country (i.e., 1971–78, 1979–1986, . . . , 2003–2010). The purpose of taking this measure is two-fold. First, we attempt to abstract from the effects of business cycles on fiscal variables. Second, this measure helps address the possible lagged effects of public (particularly, capital) spending. Note also that since our disaggregated annual fiscal data are unbalanced, we need to choose when we calculate each 8-year average. In our main analyses, we take the period average of fiscal variables only if at least 3 observations are available within each 8 year.<sup>16</sup>

Table 2 describes the dataset using the 8-year average, based on 233 observations corresponding to the reference regression equations (e.g., Table 4). The average growth rate is 17.2 percent over the 8 years, corresponding to an annual growth rate of above 2 percent. Turning to the fiscal variables, the share of total expenditure is about 29.3 percent on average, decomposed into public consumption and investment of 27 and 2.3 percent, respectively. Further, with the average total revenue of 27.3 percent, the total deficit is obtained as 2 percent. Lastly, the other explanatory variables, whose rationale is commented below, include initial GDP, initial level of schooling, private investment (relative to GDP), and population growth rates. The detailed data sources are found in Appendix C.

## 3 Empirical Specification and Methodology

First, we present our empirical model, highlighting the interaction between institutions and public spending in regression equations. We then explain our estimation method, with particular emphasis on how we tackle the potential endogeneity issues.

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<sup>16</sup>We conduct a robustness check below, with different threshold values to take the period average. However, in general, a too stringent value turns out to critically reduce the number of available observations, while a too lenient value may not exactly reflect the sample average.

Table 2: Descriptive Statistics: 8-year non-overlapping averages

Variable	Mean	Standard deviation	Minimum	Maximum
Growth rate (8 years)	17.2	16.7	-41.3	66.3
Total spend/GDP	29.3	9.7	11.8	54
Invest spend/GDP	2.3	2	0.3	13.7
Cons spend/GDP	27	9.9	10.4	51.5
Total rev/GDP	27.3	9.1	11.5	47.9
Overall balance/GDP	2	3.6	-11.6	13.9
Initial GDP p.c. (log)	9	1.1	5.6	10.9
Initial level of schooling	7.3	3.1	0.6	13.4
Private investment/GDP	19.9	5.2	3.7	39.6
Population growth	1.3	1.3	-1	9

Note: Statistics are based on 233 observations. The Initial GDP is the log of 2005 US\$. Initial level of schooling years are the average years of schooling for population aged between 25 and 64. The other figures are in percent.

### 3.1 Empirical specification

Our empirical specification is motivated by neoclassical growth models. The models generally relate the growth of real GDP per capita to two types of variables: state and control/environmental (hereafter, denoted as control) variables. The former variables describe the initial position of the economy, whereas the latter determine the steady state. A key prediction of such models is that when the initial position of the economy is controlled for, an increase in steady state output leads to higher growth rates during the (seemingly) long adjustment period towards the steady state.<sup>17</sup> Based on this prediction, we examine how public spending, decomposed into current and capital spending, affects the steady state and thus the growth rate depending on the levels of government accountability.

Formally, our empirical specification is given as

$$y_{i,t} - y_{i,t-x} = (\alpha - 1)y_{i,t-x} + \beta u_{i,t-x} + \bar{f}'_{i,t}\phi + \sum_{j=1}^n \eta_j \bar{z}_{i,j,t} + \nu_i + \xi_t + \epsilon_{i,t}. \quad (1)$$

The left-hand side (LHS),  $y_{i,t} - y_{i,t-x}$ , is the difference in the log of real GDP per capita between year  $t$  and  $t-x$  in country  $i$ . Specifically, we set  $x = 8$ , indicating that one period lasts

<sup>17</sup>The steady state growth rate is determined exogenously in these growth models.

8 years and thus yielding 5 observations per country at maximum.<sup>18</sup> Explanatory variables on the right-hand side (RHS) include initial real GDP per capita,  $y_{i,t-x}$  and initial average years of schooling,  $u_{i,t-x}$ , as state variables. The former variable is used as a proxy for initial physical capital, while the latter is used for initial human capital. Next,  $\bar{f}'_{i,t}$  is a vector of fiscal variables as control variables, all given as average values from year  $t-x$  to  $t-1$ . In turn, motivated by the Solow growth model,  $\bar{z}_{i,j,t}$  contain the control variables such as private investment rates and population growth rates, again as period averages.<sup>19</sup>  $\nu_i$  represents unobserved country-specific effects (i.e., fixed effects). Finally,  $\xi_t$  is a time dummy, capturing global shocks.

Focusing on a vector of fiscal variables,  $\bar{f}'_{i,t}\phi$ , they are expressed as

$$\bar{f}'_{i,t}\phi = \sum_{j=1}^2 \zeta_j^H H_i \bar{e}_{i,j,t} + \sum_{j=1}^2 \zeta_j^L L_i \bar{e}_{i,j,t} + \gamma^H H_i \bar{r}_{i,t} + \gamma^L L_i \bar{r}_{i,t} + \chi^H H_i \bar{b}_{i,t} + \chi^L L_i \bar{b}_{i,t}. \quad (2)$$

In the RHS,  $H_i$  is a dummy variable which takes the value of 1 if the government accountability level is high in country  $i$ , whereas  $L_i$ , also a dummy, equals 1 if the accountability is low. These dummies interact with all the fiscal variables considered, all as a ratio to GDP:  $\bar{e}_{i,j,t}$ , the different spending components, i.e., capital ( $j=1$ ) and current spending ( $j=2$ );  $\bar{r}_{i,t}$ , total revenue; and  $\bar{b}_{i,t}$ , overall budget deficit (i.e., total expenditure minus total revenue).<sup>20</sup>

Notice, however, that because the government budget constraint implies that fiscal variables yield exact multicollinearity in Eq. 2, it is necessary to leave out at least one fiscal component to estimate the model. Suppose, for illustration, that we leave out the budget

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<sup>18</sup>The reason for this choice, rather than a commonly used 5-year period, is to allow for a potentially lagged effect of capital spending. More practically, however, given that using a 5-year average yields 8 periods at maximum, a number of instruments under our system GMM approach (explained below) tends to become too large, particularly with a relatively large number of endogenous variables in the equation.

<sup>19</sup>We exclude public investment rates to avoid double-counting.

<sup>20</sup>While total revenue can be potentially decomposed into the four main sub-components, i.e., taxes, social contributions, grants and other revenue, we do not pursue this avenue focusing on the composition of spending.

deficit,  $\bar{b}_{i,t}$ . Then, Eqs. 1 and 2 yield:

$$\begin{aligned}
y_{i,t} - y_{i,t-x} = & (\alpha - 1) y_{i,t-x} + \beta u_{i,t-x} + \sum_{j=1}^2 (\zeta_j^H + \chi^H) H_i \bar{e}_{i,j,t} + \sum_{j=1}^2 (\zeta_j^L + \chi^L) L_i \bar{e}_{i,j,t} \\
& + (\gamma^H - \chi^H) H_i \bar{r}_{i,t} + (\gamma^L - \chi^L) L_i \bar{r}_{i,t} + \sum_{j=1}^n \eta_j \bar{z}_{i,j,t} + \nu_i + \xi_t + \epsilon_{i,t}.
\end{aligned} \tag{3}$$

Importantly, coefficients on the remaining fiscal variables in Eq. 3 represent the effects of these variables on growth, particularly when financed by a change in  $\bar{b}_{i,t}$ , the omitted fiscal variable. This point, first emphasized by [Kneller et al. \(1999\)](#), illustrates the importance of taking the budget constraint into account when estimating the growth effects of fiscal variables. Specifically, the coefficients on capital and current spending thus capture the effects of a rise in the respective spending financed by an equal rise in the deficit, while the coefficient on the revenue shows the effect of its rise corresponding to a fall in the deficit. In what follows, we will compare the growth effect of each spending component for the alternative financing sources, between countries with high- and low-government accountability.

### 3.2 Estimation strategy

We estimate this dynamic panel data model using a GMM approach. There are various reasons for this choice. First, the framework is flexible enough to accommodate our unbalanced panel. Second, it allows us to handle country fixed effects.<sup>21</sup> Third, most notably, it enables us to tackle the potential endogeneity of all fiscal variables through the use of internal instruments (i.e., instruments based on lagged values of those variables). This is important because endogeneity issues of fiscal and institution proxies appear to be a non-trivial concern. For example, even if a positive correlation is observed between capital spending and growth, this does not necessarily imply that a higher amount of such spending causes higher growth.

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<sup>21</sup>To handle fixed effects, we transform variables through ‘orthogonal deviations’ ([Arellano and Bover \(1995\)](#)) rather than first differencing. We use this measure because it maximizes the sample size in our unbalanced panel.

Causality could in fact be reverse. Furthermore, a similar concern with reverse causation is likely to apply to the level of accountability.

While the GMM approach yields consistent estimators, however, the original ‘difference’ GMM estimators developed by [Holtz-Eakin et al. \(1988\)](#) and [Arellano and Bond \(1991\)](#) may suffer from finite sample biases. These biases arise particularly when time series are persistent. Indeed, [Bond et al. \(2001\)](#) point out that such biases are likely to be large in the context of empirical growth models, as output tends to be a largely persistent variable. They thus recommend the alternative ‘system’ GMM estimators developed by [Arellano and Bover \(1995\)](#) and [Blundell and Bond \(1998\)](#), which augment the difference estimator by combining the regression in differences with the regression in levels in a system in which the two equations are separately instrumented. We use this system procedure below.<sup>22</sup>

Specifically, we treat the state variables of the model, i.e.,  $y_{i,t-x}$  and  $u_{i,t-x}$  as predetermined variables, while treating all the control variables as endogenous. That is, we assume that the country-specific time-varying shocks,  $\epsilon_{i,t}$ , are uncorrelated with initial GDP and human capital in  $t - x$  and earlier, while they are uncorrelated with the average of the other control variables from  $t - (x + 1)$  to  $t - (2 * x)$  and earlier. Further, to ensure the validity of this system approach in our context, we conduct various specification tests. The first is the Arellano-Bond test, whose purpose is to examine the hypothesis that the error term is not serially correlated, which is implicitly assumed in the orthogonality conditions. The second is the Hansen test, which checks the overall validity of the various instruments of the system.

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<sup>22</sup>Alternatively, some recent works on fiscal policy and growth use the Mean-Group (MG) and/or Pooled Mean-Group (PMG) estimators developed by [Pesaran and Smith \(1995\)](#) and [Pesaran et al. \(1999\)](#), respectively (e.g., [Gemmell et al. \(2011\)](#) and [Arnold et al. \(2011\)](#)). These estimators have their own advantages. Notably, they allow for simultaneous investigation of long-run equilibrium relations and short-run adjustment processes, with key parameters allowed to be heterogeneous (in the case of PMG, the heterogeneity is assumed only in the short-run coefficients), while the GMM approach only considers the long-run relation and does not allow for heterogeneity other than the intercept. However, one potential downside of these alternative approaches is that because the use of annual data is often required (to have a large number of time series observations), the effect of business cycles can be more problematic than in our 8-year average framework. In addition, the fact that our highly disaggregated fiscal expenditure dataset is unbalanced does not allow us to practically use either of these alternative estimators.



Finally, the third is the difference-in-Hansen test, which examines the validity of the different sets of instruments used in the level part of the system.

## 4 Results

First, we examine the nexus between public spending policies and growth, with and without taking account of the role of institutions. Then, conducting various robustness checks on their role, we provide an interpretation of the robust results. Last, we suggest that the efficiency of public spending may be a key channel through which institutions, particularly the ones constraining governments' rent-seeking behavior, affect growth.

### 4.1 Without the role of institutions considered

Table 3 first examines the effects of public spending on growth without distinguishing countries' institutions affecting the level of government accountability.<sup>23</sup> In Columns (1) and (2), where total revenue and overall deficit (both relative to GDP) are left out from the respective regression equations, the coefficient on total spending measures its effect on economic growth, when it is financed by a rise in these fiscal variables, respectively. An increase in total spending has a positive effect on growth only when financed through revenue, with statistical significance at the 5 percent level. To interpret the coefficient, a rise in the ratio of total spending to GDP by 1 percentage point, financed by an equal rise in revenue, leads to 1.04 percentage points rise in the growth rates over the 8-year period, corresponding to an annual rise by about 0.13 percentage points.

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<sup>23</sup>To facilitate comparison with the subsequent regressions where government accountability is reflected, this table only covers observations for which the all the institution proxies are available.

Table 3: Public spending and growth: without institutions considered

Dependent variable: GDP per capita growth over 8 years					
Regressors	Total spending		Total spending decomposed		
	(1)	(2)	(3)	(4)	(5)
Total spend/GDP	1.044** (0.430)	-1.076 (0.830)			
Cap spend/GDP			2.888 (1.887)	3.468* (1.939)	1.493 (1.817)
Cur spend/GDP				0.580 (0.358)	-1.395* (0.719)
Revenue/GDP		2.120** (0.844)	0.580 (0.358)		1.975** (0.792)
Deficit/GDP	-2.120** (0.844)		-1.395* (0.719)	-1.975** (0.792)	
Initial GDP p.c.	-9.739** (4.529)	-9.739** (4.529)	-8.317** (3.647)	-8.317** (3.647)	-8.317** (3.647)
Initial Schooling	0.969 (1.999)	0.969 (1.999)	1.930 (1.941)	1.930 (1.941)	1.930 (1.941)
Private inv/GDP	2.571*** (0.606)	2.571*** (0.606)	2.342*** (0.534)	2.342*** (0.534)	2.342*** (0.534)
Pop growth	-2.918 (3.846)	-2.918 (3.846)	-4.751 (3.793)	-4.751 (3.793)	-4.751 (3.793)
Financing source	Revenue	Deficit	Cur spend	Revenue	Deficit
Observations	233	233	233	233	233
No. of countries	80	80	80	80	80
No. of instruments	45	45	51	51	51
Arellano-Bond AR(1), p-value	0.01	0.01	0.01	0.01	0.01
Arellano-Bond AR(2), p-value	0.10	0.10	0.13	0.13	0.13
Hansen, p-value	0.68	0.68	0.80	0.80	0.80
Diff Hansen 1, p-value	0.50	0.50	0.75	0.75	0.75
Diff Hansen 2, p-value	0.74	0.74	0.96	0.96	0.96

Notes: System GMM estimations for dynamic panel data models. Constant and time dummies are not shown for brevity. All explanatory variables were treated as endogenous except for initial GDP p.c. and initial schooling year, which were treated as predetermined. Orthogonal deviation was used to transform variables. Only one lag was used as an internal instrument to reduce the number of instruments. Robust standard errors are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Diff Hansen 1 tests the exogeneity of the instruments used in the level part (of the system) as a whole. Diff Hansen 2 tests the exogeneity of the lagged level of output used as an instrument in the level part.

In turn, Columns (3) to (5), disaggregating total public spending into capital and current spending components, examine the growth effects of the latter. Column (3) indicates that although capital spending has a positive growth effect when financed by a fall in current spending, the effect is statistically insignificant. Next, Column (4) shows that with revenue

as a financing source (as in Column (1)), the capital component of spending, in particular, has a positive and statistically significant effect, while the current component is insignificant, hinting that the positive effect in Column (1) may be driven by the capital component. Finally, Column (5), treating budget deficit as a financing source, shows that only a rise in the current component of spending has a negative growth effect. Overall, capital spending appears to have a larger scope for enhancing growth than current spending. Still, however, its scope appears to be limited, with the only significant effect observed when financed through revenue.

Regarding the other fiscal variables, the growth effect of a rise in the deficit, offset by a fall in revenue, is negative and statistically significant (see Columns (1) and (4)), while the alternative combination, i.e., a rise in revenue, inducing a fall in the deficit, has exactly opposite results (see Columns (2) and (5)) due to the symmetric nature of our analyses.<sup>24</sup> Turning to the other explanatory variables, first, the coefficient on the initial GDP per capita (expressed in percent) is negative and significant, being consistent with the conditional convergence hypothesis.<sup>25</sup> Next, the years of schooling, a proxy for initial human capital, has a positive effect, albeit the effect is insignificant. Further, as suggested by the Solow model, the ratio of private investment to GDP has a positive effect, while the population growth rate has a negative effect, although the latter is insignificant. Finally, the diagnostic tests support the use of system GMM estimators, indicating the absence of serial correlation of the error term (i.e, Arellano-Bond, AR(2)) and validating the internal instruments in the system as a whole (i.e., Hansen test) and their subsets in the level part of the system (i.e., Difference Hansen tests).<sup>26</sup>

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<sup>24</sup>Because of this nature, it is not necessary to show regression equations with all the possible financing components. For example, when total spending is decomposed, all the fiscal coefficients with capital spending as a financing component can be deduced from the remaining equations.

<sup>25</sup>The relatively small convergence rate of 8.3 percent in Columns (3) to (5) (over the 8 years) is perhaps due to the heterogeneous sample with diverse development levels.

<sup>26</sup>One concern, however, is that the p-value of the Arellano-Bond, AR(2) test is relatively low, though this turns out to be higher when institutional differences are considered.

## 4.2 Role of institutions

We now examine the growth effects of public spending components according to the level to which institutions prompt governments to be accountable. As illustrated in Eq. 3, our focus is thus on the interaction terms between spending variables and government accountability levels of each country. Using the median of the accountability level as a cut-off, the total of 80 countries are divided into ones with high- and low-level accountability for respective proxies (detailed in Table 10 in Appendix A). First, we use “executive constraints” and more widely-defined “democracy/autocracy” as accountability proxies.

Regarding the role of institutions in the effect of capital spending, Columns (1) and (2) of Table 4 indicate that while this spending item, when financed through a fall in current spending, has a significant positive effect under more-accountable (accountable, for short) governments for both proxies, under less-accountable (unaccountable, for short) governments, it has a significant effect only when “democracy/autocracy” is used as a proxy. Moreover, the effect is more economically significant under accountable governments. Specifically, a rise in the ratio of capital spending to GDP by 0.1 percentage point, offset by the equal fall in current spending, over the 8-year period, increases the growth rate by about 0.9 percentage points during the same period, corresponding to an annual rise by over 0.1 percentage points.<sup>27</sup>

Next, Columns (3) and (4) show that in both accountability groups, capital spending, financed by revenue, promotes growth, although the coefficients are again significantly larger under accountable governments. Last, Columns (5) and (6) indicate that only under accountable governments, a deficit-financed rise in capital spending enhances growth. As for the growth-enhancing prospect of current spending, there is an indication that a rise in this spending, financed through revenue, enhances growth under unaccountable governments. In the case of deficit-financing cases, however, a rise in this spending has negative significant effects, regardless of accountability levels.

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<sup>27</sup>A rise in the share of capital spending to GDP by 0.1 percentage point corresponds to approximately 4 percent of average capital spending (see Table 2).

Table 4: Public spending and growth: role of institutions

Dependent variable: GDP per capita growth over 8 years						
Regressors	(1)	(2)	(3)	(4)	(5)	(6)
Cap spend*Highacc	9.010** (3.986)	9.035** (4.002)	9.457** (3.879)	9.524** (3.903)	7.391* (3.801)	7.494* (3.852)
Cap spend*Lowacc	2.902 (1.829)	3.366* (1.877)	3.662* (1.862)	4.078** (1.912)	1.487 (1.587)	1.834 (1.638)
Cur spend*Highacc			0.447 (0.361)	0.489 (0.365)	-1.620* (0.901)	-1.541* (0.874)
Cur spend*Lowacc			0.760** (0.290)	0.712** (0.281)	-1.415* (0.766)	-1.532** (0.748)
Revenue*Highacc	0.447 (0.361)	0.489 (0.365)			2.067** (0.904)	2.030** (0.881)
Revenue*Lowacc	0.760** (0.290)	0.712** (0.281)			2.175*** (0.798)	2.244*** (0.794)
Deficit*Highacc	-1.620* (0.901)	-1.541* (0.874)	-2.067** (0.904)	-2.030** (0.881)		
Deficit*Lowacc	-1.415* (0.766)	-1.532** (0.748)	-2.175*** (0.798)	-2.244*** (0.794)		
Initial GDP p.c.	-8.390** (3.683)	-8.925** (3.840)	-8.390** (3.683)	-8.925** (3.840)	-8.390** (3.683)	-8.925** (3.840)
Initial Schooling	2.098 (1.906)	2.159 (1.943)	2.098 (1.906)	2.159 (1.943)	2.098 (1.906)	2.159 (1.943)
Private inv/GDP	2.066*** (0.512)	2.106*** (0.544)	2.066*** (0.512)	2.106*** (0.544)	2.066*** (0.512)	2.106*** (0.544)
Pop growth	-4.991 (3.213)	-4.866 (3.355)	-4.991 (3.213)	-4.866 (3.355)	-4.991 (3.213)	-4.866 (3.355)
Financing source	Cur spend	Cur spend	Revenue	Revenue	Deficit	Deficit
Accountability proxy	Const	Democ	Const	Democ	Const	Democ
Observations	233	233	233	233	233	233
No. of countries	80	80	80	80	80	80
No. of instruments	69	69	69	69	69	69
Arellano-Bond AR(1)	0.01	0.01	0.01	0.01	0.01	0.01
Arellano-Bond AR(2)	0.27	0.31	0.27	0.31	0.27	0.31
Hansen, p-value	0.91	0.91	0.89	0.91	0.89	0.89
Diff Hansen 1, p-value	0.92	0.82	0.88	0.81	0.89	0.78
Diff Hansen 2, p-value	1.00	1.00	0.95	1.00	0.83	0.80

Notes: System GMM estimations for dynamic panel data models. Constant and time dummies are not shown for brevity. All explanatory variables were treated as endogenous except for initial GDP p.c. and initial schooling year, which were treated as predetermined. Orthogonal deviation was used to transform variables. Only one lag was used as an internal instrument to reduce the number of instruments. Robust standard errors are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Diff Hansen 1 tests the exogeneity of the instruments used in the level part (of the system) as a whole. Diff Hansen 2 tests the exogeneity of the lagged level of output used as an instrument in the level part.

Focusing on the qualitative effects, Table 5 summarizes findings on the role of institutions in the growth effects of public spending, together with the cases where the alternative accountability proxies of “voice and accountability” and “political checks and balances and competitiveness of elections” are used. (The full estimation results with these alternative proxies are found in Table 11 in Appendix D.) There, each cell indicates whether a rise in a respective spending, financed by different fiscal components, promotes/reduces growth, denoted by +/– signs with star-superscripts for statistically significant effects. Note that since results on a rise in current spending, financed though a fall in capital spending, are the exact opposites of the ones on a rise in the latter offset by the former, they are not presented for brevity.

Table 5: Government accountability, spending composition and growth

Financing source	Spending component increased							
	<i>High accountability</i>				<i>Low accountability</i>			
	Capital spending							
	Const	Democ	Voice	Checks	Const	Democ	Voice	Checks
Current spending	++	++	++	++	+	+	+	+
Revenue	++	++	++	++	+	++	+	+
Budget deficit	+	+	++	+	+	+	+	+
	Current spending							
Revenue	+	+	+	+	++	++	+++	+
Budget deficit	–*	–*	–*	–**	–*	–**	–	–***

Notes: Results are based on 80 countries, covering 233 observations. System GMM estimators are used with the same specifications as specified above in Table 4. + (–): growth enhancing (reducing). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Overall, the following main observations are in order. First, capital spending appears to have a considerable growth-promoting scope under accountable governments, exhibiting significant positive effects when financed through revenue, a fall in current spending, and budget deficit, for all the proxies. Meanwhile, under unaccountable governments, this spending has more limited growth-promoting potential, with less robust results when it is offset by a fall in current spending and with unanimous insignificant effects for the deficit-financed case. Second, a rise in current spending, financed through a rise in revenue, may have a growth-fostering effect particularly under unaccountable governments. Notice that these ap-

parent roles of institutions in the growth effects of public spending were concealed in the previous analyses in Table 3.

## 4.3 Robustness

### 4.3.1 Restricting datasets

To check the robustness of the above observations, we first restrict the dataset used in the reference analyses (to obtain Table 5), in terms of countries' income levels, time periods, and outliers in the disaggregated spending series.

**Income levels** Acknowledging that the dataset, covering countries from various income levels, is rather heterogeneous, we here run the regressions excluding countries with low income through the sample period (1970-2010).<sup>28</sup> The summary results, without 12 low-income countries, are presented in Table 6.<sup>29</sup> With this restricted sample, under accountable governments, capital spending has significant growth-promoting effects for all the financing sources, including the budget deficit, whereas under unaccountable ones, the effects are much weaker, with the slight sign of significant effects observed only when it is financed through revenue. Meanwhile, a revenue-financed rise in current spending fosters growth particularly under unaccountable governments. Overall, the results are similar with the reference case in Table 5, except that the scope for capital spending to promote growth under unaccountable governments is more limited.

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<sup>28</sup>Specifically, we classify countries into high-, medium- and low-income levels by taking the following procedure. First, for each of the 41 years (1970-2010), we sort 183 countries available in the IMF's World Economic Outlook (WEO) according to their GDP per capita level (PPP prices) into three groups: the highest 33th percentile, between the 33th and 67th percentiles, and from the 67th percentile onwards. Next, we count the number of times each country appears in those three groups during those years. We then classify countries that appear above the top 33th percentile most frequently as high-income countries. Similarly, countries that appear between the 33th and 67th most frequently are grouped as middle-income countries. The remaining countries are categorized as low-income countries. Our classification thus reflects the relative income levels among all the countries over the whole sample period.

<sup>29</sup>We do not consider the case without the high-income countries, since it leaves too few observations.

Table 6: Robustness check: restricting datasets

Financing source	Spending component increased							
<i>Without low-income countries</i>								
	<i>High accountability</i>				<i>Low accountability</i>			
	Const	Democ	Voice	Checks	Const	Democ	Voice	Checks
Current spending	+***	+**	+**	+**	+	+	+	+
Revenue	+***	+***	+**	+***	+*	+*	+	+
Budget deficit	+**	+**	+**	+*	+	+	+	+
	Current spending							
Revenue	+	+	+*	+	+***	+***	+***	+**
Budget deficit	-	-	-*	-	-	-*	-	-**
<i>Without period 5, 2003-2010</i>								
	<i>High accountability</i>				<i>Low accountability</i>			
	Const	Democ	Voice	Checks	Const	Democ	Voice	Checks
Current spending	+*	+*	+*	+**	+	+	+	+
Revenue	+**	+**	+*	+**	+	+	+	+*
Budget deficit	+	+	+	+	+	+	+	+
	Current spending							
Revenue	+*	+**	+*	+*	+**	+**	+**	+**
Budget deficit	-	-	-	-*	-	-	-	-*
<i>Without period 1, 1971-1978</i>								
	<i>High accountability</i>				<i>Low accountability</i>			
	Const	Democ	Voice	Checks	Const	Democ	Voice	Checks
Current spending	+*	+*	+*	+**	+	+	-	+
Revenue	+**	+*	+**	+**	+	+	+	+
Budget deficit	+*	+*	+*	+*	-	-	-	-
	Current spending							
Revenue	+	+	+	+	+***	+***	+**	+**
Budget deficit	-	-	-	-*	-***	-***	-	-***
<i>Without outliers</i>								
	<i>High accountability</i>				<i>Low accountability</i>			
	Const	Democ	Voice	Checks	Const	Democ	Checks	Voice
Current spending	+*	+*	+*	+**	+	+	+	+
Revenue	+**	+*	+*	+**	+	+	+	+
Budget deficit	+*	+	+	+*	+	+	-	+
	Current spending							
Revenue	+	+	+	-	+	+	+	+
Budget deficit	-	-	-	-*	-*	-*	-	-***

Notes: For the case without low-income countries (period 5, period1, outliers), results are based on 68 (77, 77, 80) countries covering 207 (196, 195, 218) observations. System GMM estimators are used with the same specifications as specified above in Table 4. + (-): growth enhancing (reducing). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The underlying estimation results are available from the authors upon request.



**Time periods** Next, to address the possibility that the results may be driven by observations in some particular periods, for instance, the final 8-year period (2003-2010) in which many of the advanced economies faced a surge in budget deficit after the financial crisis, we run the regressions excluding some specific periods. Table 6 presents the results for the cases without the last (2003-10) and the first (1971-78) periods, respectively. It again shows that capital spending has strong growth-promoting potential only under accountable governments, with a reallocation from current spending never showing promoting effects under unaccountable governments. However, even under the former governments, the growth-promoting effect of deficit-financed capital spending appears less robust. As for a revenue-financed rise in current spending, the case without period 5 suggests that this policy measure may foster growth regardless of the level of accountability.

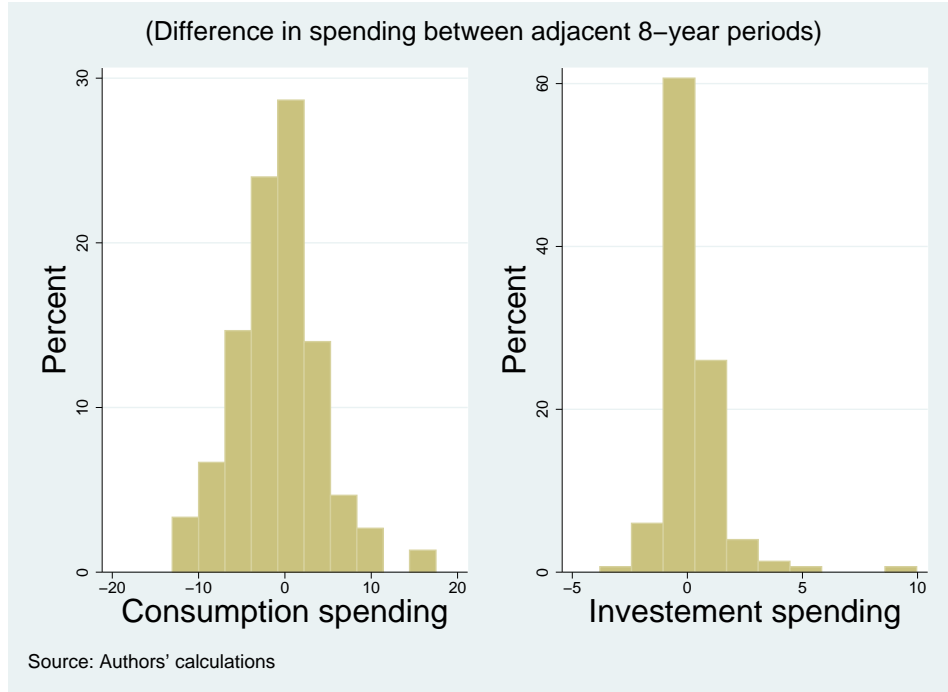
**Outliers** We also consider the possible roles of outliers. Arguably, the most important source of outliers may be the disaggregated public spending series. For example, despite our effort to construct the consistent series across different methodologies, the unification process may still leave unintended gaps across time, which could bias the results in our estimations exploiting time variations in public spending. Given this possibility, we first examine if there are any unusual “jumps” in the respective spending series. In particular, describing the changes between adjacent 8-year periods in the spending series, Figure 2 hints the existence of some outliers, including rises in capital spending by almost 10 percentage points and in current spending by more than 15 percentage points.<sup>30</sup>

To deal with them, we tentatively regard the 2 largest rises, including the apparent outliers mentioned, and the 2 largest falls (to be symmetric) in each series as outliers, and then remove all the subsequent fiscal data in countries where these outliers are detected. Table 6 confirms that the growth-promoting effects of capital spending are still significant only under accountable governments, particularly when it is financed by a fall in current

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<sup>30</sup>This increase in capital spending, for instance, is observed in Gabon between the 2nd and 3rd 8-year periods, i.e., between 1979-1986 and 1987-1994 periods. To note, this is not due to potential unification errors, since the migration from GFSM1986 to 2001 happens from mid 1990s and early 2000s.

Figure 2: Outliers in disaggregated public spending series



spending and a rise in revenue. Meanwhile, the growth-fostering effect of revenue-financed current spending under unaccountable governments are no longer observed.

### 4.3.2 Amending datasets

Next, instead of restricting the reference dataset, we now make some amends to it, by considering a different way of classifying governments' accountability levels, a different cut-off value to form the 8-year average, and a different duration of each period.

**Different cut-off to classify accountability levels** We first check if the results are sensitive to changes in the threshold values for the classification of the accountability levels. In particular, while the above reference analysis summarized in Table 5 adopts the median value as a threshold, we now change it to the lower-third (33 percentile), implying that only governments with particularly low accountability are now classified as unaccountable.<sup>31</sup> Table 7

<sup>31</sup>For the higher threshold, we divide at the 60 percentile rather than at the (more natural) 67 percentile, because in terms of “executive constraint”, one of the proxies, more than a third of 80 countries actually score the maximum (7) on average, making the division at the latter percentile not feasible. For the 60

shows that the growth-fostering effects of capital spending, financed through a fall in current spending and a rise in revenue, are robust only under accountable governments. Regarding the revenue-financed rise in current spending, we again see some indication that it may be growth-enhancing only under unaccountable governments, though it is not necessarily robust.

**Different cut-off to form fiscal period averages** With unbalanced fiscal data series, the analyses so far take the 8-year period average if at least 3 annual observations are available within the period. Here, we change the threshold value to 4 observations, which implies that each observation becomes closer to the real (but not observed) average, at the cost of losing observations (211) and covering a smaller number of countries.<sup>32</sup> Table 7 again conveys similar results regarding the effectiveness of capital spending, while the statistical significance of the revenue-financed rise in current spending under unaccountable governments is largely lost.

**7-year averages** Further, we use a different length of each period, the 7-year period, from 1976 onwards (yielding 5 observations at maximum per country), instead of the 8-year period used above.<sup>33</sup> The 7-year average is formed when there are at least 3 fiscal variables in each period. The results in Table 7 once again highlight robust growth-fostering effects of capital spending only under accountable governments, notably with no signs of such effects under unaccountable governments. However, as in the previous case, there is little indication

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percentile, however, the results (not shown for brevity) are quite similar to Table 5, the case with the median as a cut-off.

<sup>32</sup>When we experiment with the threshold value of 2, instead, the validity of internal instruments tends to be lost, with the Arellano-Bond test implying the existence of serial correlation in the error term. These apparent invalid results may be related to the fact that each 8-year average is too far away from the real average.

<sup>33</sup>We consider the 1976-2010 period, because considering, for instance, the 1971-2005 period happens to leave substantially less observations. To note, considering a shorter period length, say 5 years, turns out to be less plausible, since by having more periods (8 maximum periods, with 5-year averages), a required number of instruments dramatically increases, particularly with a relatively large number of endogenous variables including all the interaction terms. Further, shorter periods may not allow sufficient time for the growth effects of capital spending to materialize.

that revenue-financed current spending has growth-promoting effects under unaccountable governments.

Table 7: Robustness check: amending datasets

Financing source	Spending component increased							
	High accountability				Low accountability			
<i>Cut-off at 33 percentile to classify countries</i>								
	Capital spending							
	Const	Democ	Voice	Checks	Const	Democ	Voice	Checks
Current spending	+*	+*	+*	+*	+	+	+	+**
Revenue	+*	+*	+*	+**	+	+*	+	+**
Budget deficit	+	+	+	+	+	+	+	+
	Current spending							
Revenue	+	+	+	+	+***	+***	+*	+
Budget deficit	-	-	-**	-**	-	-	-	-***
<i>Different cut-off to form period average</i>								
	Capital spending							
	High accountability				Low accountability			
	Const	Democ	Voice	Checks	Const	Democ	Voice	Checks
Current spending	+*	+*	+*	+**	+*	+*	+	+
Revenue	+*	+*	+**	+**	+*	+**	+	+
Budget deficit	+	+	+	+	+	+	+	+
	Current spending							
Revenue	+	+	+	+	+	+	+*	+
Budget deficit	-	-	-**	-**	-*	-**	-	-**
<i>7-year averages, 5 periods</i>								
	Capital spending							
	High accountability				Low accountability			
	Const	Democ	Voice	Checks	Const	Democ	Voice	Checks
Current spending	+**	+**	+*	+*	+	+	-	+
Revenue	+**	+**	+*	+*	+	+	-	+
Budget deficit	+*	+*	+	+	-	-	-	-
	Current spending							
Revenue	-	+	-	+	+	+*	+	+
Budget deficit	-**	-**	-	-*	-***	-***	-*	-***

Notes: Results on the different cut-off for classification (the higher threshold to form period average, 7-year averages) are based on 80 (76, 80) countries covering 233 (211, 233) observations. System GMM estimators are used with the same specifications as specified above in Table 4. + (-): growth enhancing (reducing). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The underlying estimation results are available from the authors upon request.

### 4.3.3 Clarification of robust results

Combining all reference and robustness checks results, our robust findings on the role of institutions in the nexus between public spending and growth are twofold.<sup>34</sup> First, and most important, only under accountable governments does a rise in capital spending promote growth, particularly when it is financed through a fall in current spending or by a rise in revenue. Second, a rise in current spending does not have robust significant growth-promoting effects for any financing source, regardless of the level of government accountability.

## 4.4 Interpretation

We now attempt to shed light on those observations by providing possible interpretations. First, in general, public capital spending appears to have innately stronger growth-promoting effects than current spending, because it can increase public capital and thus enhance private firms' productivity.<sup>35</sup> This common presumption appears to be consistent with our observation that current spending does not exhibit growth-enhancing effects for any financing source, regardless of the level of government accountability. However, why are the expected growth-enhancing effects of capital spending observed only under accountable governments?

Our answer is closely related to the insightful discussions by [Tanzi and Davoodi \(1997\)](#) and [Keefer and Knack \(2007\)](#) on corruption, institutions and public spending. First, it is useful to acknowledge that there tends to be larger room for discretion by politicians in capital than current spending: they often can decide not only the overall size of capital spending, but also its timing and allocations, whereas current spending is often governed by

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<sup>34</sup>We conducted further robustness checks, including the addition of commonly-used controls in growth regressions, such as inflation rates and the degree of trade openness to the reference estimations of Table 5. Assuming that each variable is considered endogenous, we add them in turn, rather than together, to avoid a substantial increase in the number of internal instruments under the system GMM estimations. Detailed estimation results, which are in line with the ones from the other robustness checks, are available from the authors upon request.

<sup>35</sup>Of course, when considering individual subcomponents within current spending, certain components, such as operations and maintenance of existing infrastructures, may potentially enhance growth. However, various current components, including social benefit spending, which often accounts for a large proportion of current spending, do not appear to entail such enhancing effects (see, for instance, [Feldstein \(1974\)](#)).

explicit entitlements/commitments (e.g., wages, pensions and interest payments on the debt). This discretionary nature of capital spending, in turn, provides officials with convenient rent-seeking opportunities, often in the form of commissions from private enterprises, who attempt to secure the contract for capital projects.<sup>36</sup> Then, these rent-induced distortions may lower the quality of final capital goods for various reasons: contractors may skimp on the quality of projects to incorporate commissions; contractors of low-ability/efficiency may be chosen in the first place; the project itself may be unnecessarily inflated or even economically wasteful projects may be undertaken to facilitate officials' rent seeking. Besides, since this spending provides a convenient means to target narrowly-defined constituencies with, say, localized infrastructure spending, officials may also use it to gather votes (see [Cadot et al. \(2006\)](#) for the case of France). Overall, these politically-induced inefficiencies under unaccountable governments are likely to mitigate the innate growth-promoting effect of capital spending.

To shed further light on the result for capital spending under accountable governments, the observation that growth-enhancing effects of this spending are robust only when it is financed through a reallocation from current spending or by a rise in revenue indicates that the choice of the financing source matters. In particular, even under accountable governments, a deficit-financed rise in capital spending does not exhibit a robust growth-promoting effect. This seemingly significant adverse effect of running budget deficits could be related to the fact that persistent and large deficits can lead to growing public debts, which in turn may retard economic growth through, for instance, mounting interest payments.<sup>37</sup>

## 4.5 Public spending as a link between institutions and growth

The above result suggests that the efficiency of capital spending may work as a potential channel through which good institutions promote growth. To examine if this channel may be specifically operative to the institutions constraining officials' rent-seeking behaviour, we now

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<sup>36</sup>This opportunity for rent prevails because, even when such payment, often synonymous to bribes, is illegal, the complex nature of the design/contracts of capital projects makes it hard to detect it.

<sup>37</sup>These adverse effects appear to be particularly large in the case of sovereign debt crises such as the recent ones in Southern Europe.

interact the “contracting institutions” defined by [Acemoglu and Johnson \(2005\)](#), with the effectiveness of public spending. To clarify, this is a different type of institutions, because it is primarily about the horizontal relations in society between regular citizens, through the formalism of law enforcement, whereas our focus in the above analysis was rather on the vertical relations between politicians and citizens, similar to the “property rights institutions” defined by the same authors. As a proxy for the contracting institutions, we use “legal enforcement of contracts” from the Economic Freedom of the World Annual Report (EFW), the aggregate of the estimates for the time and money required to collect a debt through court.<sup>38</sup> Although the figures are available only after 2002 onwards, [Table 8](#) shows that the correlations of national averages of this proxy with the previously-used institutional proxies are rather low (about 0.3), implying that they capture different aspects of institutions (cf. [Table 1](#)).<sup>39</sup>

Table 8: Correlations among different proxies

	Executive constraint	Democracy/autocracy	Contract enforcement
Executive constraint	1		
Democracy/autocracy	0.97	1	
Contract enforcement	0.28	0.29	1

Notes: Based on 79 national averages of respective institutional proxies. All the proxies take higher values when respective institutional factors are of better quality.

Then, classifying countries by the enforcement level with the median level as a cut-off and using the same dummy variable approach as above, we interact contracting institutions with the public spending components. The summary results reported in [Table 9](#) indicate that better contracting institutions, proxied by better contract enforceability, do not necessarily imply higher effectiveness of capital spending. We conducted various checks (in line with [Table 6](#) and [Table 7](#)), confirming that this finding is robust to different specifications. Therefore, the efficiency of capital spending does not appear to be a universal channel be-

<sup>38</sup>Their original sources of the data on time and monetary costs of settling the debt case are World Bank’s Doing Business.

<sup>39</sup>To make comparison easier, we only look at the countries for which all the previous measures of institutions are available. This restriction leaves a total of 79 countries available for this enforcement proxy.

tween institutions and growth, indicating the possibility that it may be specific to the ones governing the vertical relations, as in the property rights institutions.

Table 9: Spending efficiency as a link between institutions and growth:

Financing source	Spending component increased	
	<i>High enforcement of law</i>	<i>Low enforcement of law</i>
		Capital spending
Current spending	+	+
Revenue	+	+*
Budget deficit	+	+
		Current spending
Revenue	+	+
Budget deficit	-	-**

Notes: Results are based on 79 countries covering 232 observations. System GMM estimators are used with the same specifications as specified above in Table 4. + (-): growth enhancing (reducing). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The underlying estimation results are available from the authors upon request.

## 5 Conclusion

This paper sheds light on the seemingly elusive nexus between public spending and economic growth from the perspective of institutions. Our main finding is that capital spending has growth-enhancing effects only when institutions render political officeholders accountable to the general public. These effects are particularly robust when this spending is financed through a fall in current spending or a rise in revenue. Meanwhile, an increase in current spending does not show robust growth-fostering effects for any financing source, regardless of the level of accountability. Our main interpretation is that, while capital spending tends to have larger growth-fostering effects than current spending, inefficiencies prevalent in the former type of spending, caused by unaccountable officials' rent-seeking behaviour, may mitigate its positive effects.

The critical implication then is that, to the extent that policies ensure that institutions leave smaller room for politicians' rent seeking in the public investment management, such policies may help enhance the efficiency of this spending component and thus promote growth. Thus, the question is, which potentially *viable* policies have such effects? Inspired



by [Dabla-Norris et al. \(2012\)](#), who investigate public investment efficiency by dividing the investment management into the four stages of project appraisal, selection, implementation and evaluation, we suggest a few possible measures which may have such effects. For instance, in the appraisal stage, an independent peer review can be encouraged to help ensure the objectivity and quality of project appraisals; in the project selection stage, key information such as the external audit reports and contract awards should be disclosed to the public; the implementation stage should then be accompanied with the comprehensive expenditure commitment controls; last, in the evaluation stage, routine evaluation by the auditor general should become mandatory. All these measures would help ensure policymakers to be more accountable and thus be expected to improve the efficiency of capital spending.

Finally, we conclude by acknowledging a possible extension. Although we consider the effects of capital spending while treating private investment as given, it would eventually be more realistic to assume that there is a non-negligible interaction between them. When allowing for such an interaction, one factor which is likely to matter is the degree of substitutability/complementarity between the public and private investments. For example, [Baier and Glomm \(2001\)](#) theoretically show that, depending on the degree of substitution between them, public investment can either crowd out or in private investment, thus having different growth effects. Given that it appears plausible to think that accountable governments, in particular, may attempt to crowd in (rather than out) private investment, institutions may in fact play further critical roles in the nexus between public spending and growth. Thus, although it is beyond the scope of the present paper, an investigation into the role of institutions in the interaction between the public and private investments may be a potentially fruitful avenue for future research.

# Appendix

## A Classification of countries by institutions

Table 10 classifies the 80 countries used in the reference regressions (cf. Table 5) into 40 countries with high- (low-) government accountability, based on the respective national averages of respective proxies over the 1970-2010 period.

Table 10: Classification of countries by accountability levels

Country	Exe constraints	Democracy/Autocracy	Voice and accountability	Checks/Balances
Argentina	Low	Low	Low	High
Australia	High	High	High	High
Austria	High	High	High	High
Bahrain, Kingdom	Low	Low	Low	Low
Belgium	High	High	High	High
Bolivia	High	Low	Low	High
Bulgaria	Low	Low	High	Low
Burundi	Low	Low	Low	Low
Cameroon	Low	Low	Low	Low
Canada	High	High	High	High
Chile	Low	Low	High	Low
Colombia	High	High	Low	Low
Costa Rica	High	High	High	High
Croatia	High	Low	Low	Low
Cyprus	High	High	High	Low
Czech Republic	High	High	High	High
Denmark	High	High	High	High
Dominican Republic	Low	High	Low	High
Egypt	Low	Low	Low	Low
El Salvador	Low	Low	Low	Low
Estonia	High	High	High	High
Fiji	High	High	Low	High

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Country	Exe constraints	Democracy/Autocracy	Voice and accountability	Checks/Balances
Finland	High	High	High	High
France	High	High	High	High
Gabon	Low	Low	Low	Low
Germany	High	High	High	High
Greece	High	High	High	Low
Guatemala	Low	Low	Low	Low
Hungary	Low	Low	High	Low
India	High	High	Low	High
Indonesia	Low	Low	Low	Low
Iran, I.R. of	Low	Low	Low	Low
Ireland	High	High	High	High
Israel	High	High	High	High
Italy	High	High	High	High
Jamaica	High	High	High	High
Japan	High	High	High	High
Jordan	Low	Low	Low	Low
Kenya	Low	Low	Low	Low
Korea, Republic	Low	Low	High	Low
Kuwait	Low	Low	Low	Low
Latvia	High	High	High	High
Lesotho	Low	Low	Low	Low
Lithuania	High	High	High	Low
Luxembourg	High	High	High	High
Mauritius	High	High	High	High
Mexico	Low	Low	Low	Low
Mongolia	Low	Low	Low	Low
Morocco	Low	Low	Low	Low
Namibia	Low	High	Low	Low
Netherlands	High	High	High	High
New Zealand	High	High	High	Low

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Country	Exe constraints	Democracy/Autocracy	Voice and accountability	Checks/Balances
Norway	High	High	High	High
Pakistan	Low	Low	Low	Low
Panama	Low	Low	High	Low
Paraguay	Low	Low	Low	Low
Peru	Low	Low	Low	Low
Philippines	Low	Low	Low	Low
Poland	Low	Low	High	Low
Portugal	High	High	High	Low
Romania	Low	Low	Low	High
Russian Federation	Low	High	Low	High
Singapore	Low	Low	Low	Low
Slovak Republic	High	High	High	High
Slovenia	High	High	High	High
South Africa	High	High	High	Low
Spain	High	High	High	High
Sri Lanka	High	High	Low	High
Sweden	High	High	High	High
Switzerland	High	High	High	Low
Tanzania	Low	Low	Low	Low
Thailand	Low	Low	Low	High
Togo	Low	Low	Low	Low
Tunisia	Low	Low	Low	Low
Turkey	High	High	Low	High
Ukraine	High	High	Low	High
United Kingdom	High	High	High	High
United States	High	High	High	High
Uruguay	High	High	High	Low
Zambia	Low	Low	Low	Low

Notes: This table contains 80 countries corresponding to the reference case above. The median value is used as a cut-off value of each series, so that each comprises 40 high- and low-accountability countries.

## B Construction of fiscal dataset

To explain how we construct unified disaggregated spending series following economic classifications, we start with clarifying the main differences in the exact definitions of ‘current’ and ‘capital’ concepts under GFSM2001 and GFSM1986 (see [Wickens \(2002\)](#) for details). First, the capital expenditure concept under GFSM2001, denoted as ‘net acquisition of non-financial assets’ adopts a net concept, taking into account government revenue from the sales of fixed capital assets, while capital expenditure under GFSM1986, following a gross concept, does not deduct the revenue from capital sales, which is recorded as part of total revenue. Second, while capital transfers were a part of capital expenditure under GFSM1986, they are part of the current expenditure concept, denoted as ‘expense’, under GFSM2001.

Facing these differences, we first retrieved all historical spending data available for all countries that have reported data to the IMF’s GFS yearbook from 1970 to 2010 and then converted all spending items under GFSM1986 into the concepts defined by GFSM2001, so that the capital spending in our spending series deducts sales revenues and excludes capital transfers, with the latter included in the current spending. However, there is one key remaining issue to be dealt with, related to the fact that the concept of ‘consumption of fixed capital’, i.e., a decline in the value of fixed assets owned and used by a government (due to physical deterioration, obsolescence, or accidental damages), exists only under GFSM2001. This implies that the capital spending under GFSM1986 and GFSM2001 are still not consistent, with the former not deducting this ‘depreciation’ of capital. To deal with this, for the data originally retrieved from GFSM2001, we move the consumption of fixed capital, originally categorised as current spending, to the capital spending component, so that the modified capital spending component become comparable to the ones from GFSM1986, i.e., without the depreciation deducted.

We also report that the level of government covered in the unified dataset is at the central government level. This is because under GFSM1986, countries report data at most at the central government level, although under GFSM2001, they also provide data for the

general government level. We use both consolidated and budgetary data to maximise the number of observations available. Last, to construct consistent total revenue series spanning two methodologies, for the total revenue data retrieved from GFSM1986, we exclude the revenue from sales of capital assets, to make it in line with the total revenue concept under GFSM2001. Having made the current and capital spending and total revenue comparable between the methodologies, we subsequently obtain the budget deficit as a difference between total expenditure, as a sum of current and capital spending, and total revenue.

## C Data sources

The GDP growth rate is obtained as the log difference over 8 years of real GDP per capita taken from the Penn World Tables (PWT) (Feenstra et al. (2013)). Initial real GDP per capita is from the same source. All the fiscal variables are originally from the IMF's GFS yearbook. To calculate fiscal data as a ratio to GDP, GDP figures are taken from the World Economic Outlook (WEO), while exchange rate data, required for unit conversion, are from both the WEO and the International Financial Statistics (IFS) databases of the IMF. Turning to the other explanatory variables, years of schooling (for the population aged between 25 and 64) is from Barro and Lee (2010). The private investment ratio is calculated as a difference between the total investment ratio (the ratio of gross fixed capital formation to GDP, from WEO) and the share of capital spending in GDP that we assembled. The population growth rate is from WEO. Last, the government accountability proxies of executive constraints, democracy/autocracy, voice and accountability, and political checks/balances are from Polity IV (Marshall et al. (2013)), Polity IV, the Database for Political Institutions (DPI, Beck et al. (2001)), and the Worldwide Governance Indicators (WGI, Kaufmann et al. (2010)), respectively, while the law enforceability proxy is from the Economic Freedom of the World Annual Report (EFW, Gwartney et al. (2013)).

## D Full estimation results

Table 11 presents the full estimation results behind Table 5.

Table 11: Public spending and growth: role of institutions with alternative proxies

Dependent variable: GDP per capita growth over 8 years						
Regressors	(1)	(2)	(3)	(4)	(5)	(6)
Cap spend*Highacc	11.046** (4.875)	6.931** (2.818)	11.525** (4.738)	7.161** (2.810)	9.344** (4.676)	5.444* (2.844)
Cap spend*Lowacc	1.908 (1.873)	3.123* (1.811)	3.080* (1.849)	3.587* (1.917)	1.237 (1.446)	1.404 (1.654)
Cur spend*Highacc			0.479 (0.346)	0.230 (0.392)	-1.702* (0.937)	-1.487** (0.741)
Cur spend*Lowacc			1.172*** (0.327)	0.463 (0.316)	-0.671 (1.033)	-1.719*** (0.545)
Revenue*Highacc	0.479 (0.346)	0.230 (0.392)			2.180** (0.970)	1.717** (0.791)
Revenue*Lowacc	1.172*** (0.327)	0.463 (0.316)			1.843* (1.006)	2.182*** (0.668)
Deficit*Highacc	-1.702* (0.937)	-1.487** (0.741)	-2.180** (0.970)	-1.717** (0.791)		
Deficit*Lowacc	-0.671 (1.033)	-1.719*** (0.545)	-1.843* (1.006)	-2.182*** (0.668)		
Initial GDP p.c.	-8.930** (3.474)	-6.950** (3.400)	-8.930** (3.474)	-6.950** (3.400)	-8.930** (3.474)	-6.950** (3.400)
Initial Schooling	2.893 (1.908)	2.414 (1.699)	2.893 (1.908)	2.414 (1.699)	2.893 (1.908)	2.414 (1.699)
Private inv/GDP	2.321*** (0.491)	1.818*** (0.506)	2.321*** (0.491)	1.818*** (0.506)	2.321*** (0.491)	1.818*** (0.506)
Pop growth	-4.609 (3.699)	-5.583* (3.140)	-4.609 (3.699)	-5.583* (3.140)	-4.609 (3.699)	-5.583* (3.140)
Financing source Accountability proxy	Cur spend Voice	Cur spend Checks	Revenue Voice	Revenue Checks	Deficit Voice	Deficit Checks
Observations	233	233	233	233	233	233
No. of countries	80	80	80	80	80	80
No. of instruments	69	69	69	69	69	69
Arellano-Bond AR(1)	0.01	0.01	0.01	0.01	0.01	0.01
Arellano-Bond AR(2)	0.29	0.14	0.29	0.14	0.29	0.14
Hansen, p-value	0.96	0.82	0.97	0.86	0.87	0.84
Diff Hansen 1, p-value	1.00	0.63	1.00	0.70	0.96	0.67
Diff Hansen 2, p-value	1.00	0.99	1.00	0.98	0.53	1.00

Notes: System GMM estimations for dynamic panel data models. Constant and time dummies are not shown for brevity. All explanatory variables were treated as endogenous except for initial GDP p.c. and initial schooling year, which were treated as predetermined. Orthogonal deviation was used to transform variables. Only one lag was used as an internal instrument to reduce the number of instruments. Robust standard errors are in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Diff Hansen 1 tests the exogeneity of the instruments used in the level part (of the system) as a whole. Diff Hansen 2 tests the exogeneity of the lagged level of output used as an instrument in the level part.



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