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Public Spending during Growth Accelerations and Decelerations: Exploring the Interaction of the **Business Cycle and Control of Corruption**

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Abstract

Public spending and its component investments in various sectors of the economy may behave differently over the business cycle, yet these dynamics are still poorly understood. The present paper analyzes the cyclicality of public spending on key social, economic and military sectors, including agriculture, education, health, social protection, transportation and military spending using data available for up to 40 developing countries spanning the period from 1980 to 2004. As a potential innovation in the literature, this study utilizes measures of governance as well as indicators for growth acceleration and deceleration episodes to try and tease out possible spending patterns juxtaposed against these conditions. An over-all assessment of the empirical results in this paper would suggest the following. First, total public spending is largely procyclical during growth decelerations and it is acyclical during growth accelerations. Second, better governance indicators are associated with a tempering of this procyclicality of total public spending. Third, even as total public spending may be procyclical, its subcomponent parts need not be. Indeed, public spending on education, agriculture, social protection and transportation all display countercyclical patterns during growth decelerations. Finally, military spending tends to be acyclical, suggesting that it neither gets cut nor surges systematically during growth accelerations or decelerations.

JEL Code: E-62; H-50; O-23 Key Words: business cycle; governance; social spending; fiscal space; countercyclical fiscal policy

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1. INTRODUCTION

The government budget process involves difficult political decisions on how resources should be raised and allocated across various competing uses. Competing interest groups exert pressure to try to influence this process both at the national and at the local government levels. Whatever the political system of the country, most agree that the budget process is characterized by competition for public resources to promote different interests.¹ It is possible that those with the weakest "voice" are least able to organize, attain the necessary skills and resources, and have their interests represented in this process. A likely outcome would be inequitable resource allocations, benefiting sectors that reflect the interests of more influential and well organized lobbying groups.

As a result, public spending and investments in various sectors of the economy may behave differently over the business cycle, yet these dynamics are still poorly understood. In order to contribute to this still nascent literature, the present paper analyzes the cyclicality of public spending on key social, economic and military sectors, including agriculture, education, health, social protection and military spending using data available for up to 40 developing countries spanning the period from 1980 to 2004. To our knowledge, this is the first study to examine these different sectoral budget components throughout the business cycle, while also factoring in the possible influence of governance and periods of growth acceleration and deceleration in the economy.

This paper finds that total public spending is largely procyclical; however its subcomponent parts need not be. Indeed, public spending on education, agriculture, social protection, and transportation all display countercyclical patterns during growth decelerations. In what follows, section 2 briefly reviews the relevant empirical literature, while section 3 outlines the data and methodology for the empirical analysis in this paper. Section 4 then reviews the key empirical results. A final section contains the main conclusions and some suggestions for follow-up research.

¹ For an extended analysis on how different interest groups could exert pressure on the budget process in different countries, see for example Robinson (2008).

2. REVIEW OF EMPIRICAL LITERATURE

The literature on the cyclicality of public spending emphasizes two main explanations behind the patterns observed across industrial and developing countries. First, international credit markets are imperfect and prevent countries from borrowing in bad times. The latter, in turn leads to a lack of capacity to undertake countercyclical policy. In addition, political economy issues also come into play. Lobbying by entrenched interest groups may tend to boost spending in some sectors. Countries with older populations, for example, tend to be both richer and spend more on social security.² Political economy factors may also help explain the tendency for fiscal profligacy and rent-seeking activities. Corrupt officials may favor public investment projects that generate the highest bribes, even as their contribution to social and economic goals may be less compelling when compared to other investments (Shleifer and Vishny 1993).

Studies have found that corruption is associated with lower education spending (Mauro 1998), as well as higher military spending (Gupta, de Mello and Sharan 2001). Further, empirical analysis by Delavallade (2006) reveals that the structure of public spending could be distorted by the prevalence of corruption, resulting in reduced social spending (e.g. education, health and social protection spending), while at the same time increasing allocations to law and order, fuel and energy, culture and defense. Strong domestic interest groups may push for higher spending in some sectors, while the weaker voice for some groups, notably the poor, tends to result in weaker public spending and investments for these groups (e.g. Alesina et al. 2008 Gavin and Perotti 1997; Talvi and Vegh 2005 and Lustig 2000).

The above-mentioned studies largely focus on public spending (and its component parts) from a structural perspective; and there is as yet very little analysis of public spending vis-a-vis the business cycle. During economic downturns, programs benefiting low income groups, the poor and those with weaker lobbying influence are likely to be more vulnerable to cuts. An analysis of budget policies during financial and economic crisis episodes has shown, for example, that public spending and investments directed primarily at the poor, notably various parts of social spending, tend to be retrenched (Lustig 2000; Mendoza 2009). Analysis by Fan and Rao (2003) further revealed that structural adjustment programs may have increased the over-all size of public spending; but as a share of total government spending, sectors benefiting the poor such as agriculture, education and health in various developing countries in Asia, Africa and Latin America received declining public sector allocations.

 $^{^{2}}$ See Shelton (2007) for an empirical analysis of the possible factors behind public expenditure trends.

Further, Ravallion (2002a) examined Argentina's budget trends in the 1980s and 1990s periods which were marked with economic volatility—and he found evidence that non-social sector spending tended to be better protected against cuts during downturns, when compared with social spending. Spending on targeted social assistance and employment programs was also much more vulnerable to aggregate spending cuts, compared to more universal social services. Social spending in general and social spending targeted at the poor in particular were typically cut during periods of fiscal austerity (Ravallion 2002a;b).

During the recent global crisis in 2008-2010, there was also widespread concern that public sector programs would be retrenched due to the contraction in revenues. The social sectors—notably education and health—are typically large components of overall public spending, especially because these sectors account for a large share of total civil servants (e.g. teachers and health sector professionals). According to the IFPRI data for the sample of 40 countries used in this study, the sum of education and health spending accounts for 15% of total public spending. Including agriculture and social protection spending under "social spending" raises that average share to 44% of total public spending. Social protection alone accounts for 23% of public spending in this sample. As such, they are typically common targets for cutbacks during crises. Preliminary analyses of public spending in education and health during the recent crisis revealed that, indeed, public social spending in many countries experienced a dramatic cut (Lewis and Verhoeven 2010; Mendoza 2009).

Nevertheless, Arze del Granado, Gupta and Hajdenberg (2010) examine the behavior of public spending on health and education in 150 countries during 1987–2007. Their study yields some evidence that education and health is procyclical in developing countries, while it is acyclical in industrial countries. Positive and negative output gaps are also asymmetrically linked to spending in education and health—the latter are procyclical during periods of positive output gap and acyclical during periods of negative output gap. They also find that the degree of cyclicality is higher for poorer countries.

Studies of military spending find evidence that this tends to be protected during periods of severe budget constraints, notably in less developed countries. Some studies find that defence allocations are preserved even as spending on the social sectors are cut back, particularly among countries with poor public finance management and weak over-all governance environments (Gyimah-Brembong 1992; Omitoogun and Hutchiful 2006). Nevertheless, in a study of the real expenditures of 24 developing countries during the 1970-1984 period, Hicks (1991) finds evidence that both expenditures on the military and the social sectors are well protected, while capital expenditures and investments tend to suffer the brunt of the real cuts when they do occur.

Further, an empirical analysis of military spending in 120 countries during the period 1985-1998 revealed that corruption is strongly associated with higher military spending as a share of both GDP and total government spending (Gupta, de Mello and Sharan 2001). Thus, the empirical literature in this area is far from conclusive, and very few studies rigorously examine the pattern of different public spending components over the business cycle.

3. EMPIRICAL METHODOLOGY

This study examines different sectoral budget components throughout the business cycle, with due consideration given to factors such as the governance environment, and periods of growth acceleration and deceleration in the economy. In what follows, we briefly describe the dataset, empirical methodology and main variables of interest.

Data

Our primary data source for public spending in 56 developing countries is from the International Food Policy Research Institute (IFPRI). Due to data availability for the full set of variables being examined, only up to 40 countries are included in some of the regressions.³ For measurements of governance quality, we turn to the International Country Risk Guide data (Political Risk Group 2009). Their rating is based on three categories of risk: political, financial and economic. Given the focus of this paper, data on political risks is used, and in particular, the focus is on the indicator on the control of corruption. We turn to a novel measure of the business cycle: indicators of growth acceleration and deceleration episodes. This dataset is due to Conceicao and Kim (2010) who build on the original methodology developed by Arbache and Page (2007). Finally, all of the variables describing fiscal space conditions are drawn from the World Bank's WDI Database.

Regression Model

In order to analyze the cyclicality and dynamic pattern of public social and military spending, we estimate the following empirical model which builds on earlier approaches in the literature as well as a related study by Doytch, Hu and Mendoza (2011).

³ The IFPRI dataset originally contained public spending data for 56 developing countries. However, due to data availability issues for the full set of variables being examined, only up to 40 are included in some regressions. Annex 1 provides a list of the countries; and a summary of the descriptive statistics is contained in Annex 2.

The empirical model that we analyze is:

$$\log s_{it}^{k} = \beta_{0} + \beta_{1} \log(s_{i,t-1}^{k}) + \beta_{2} g_{it-1}^{j} + \beta_{3} g_{it}^{j} q_{it} + \beta_{4} x_{it} + \beta_{5} \eta^{t} + \mu_{i} + \varepsilon_{it} , \qquad (1)$$

with $\mu_{i} \sim ii.d(0, \sigma_{\mu_{i}}), \ \varepsilon_{it} \sim i.i.d.(0, \sigma_{\varepsilon}), \ E[\mu_{i}\varepsilon_{it}] = 0$ and where $i = 1, ..., 136$ and $t = 1, ..., 29$

The superscript *k* stands for a *public spending index* (*k*=total spending share of GDP, education spending share of GDP, health spending share of GDP, agriculture spending share of GDP, social protection spending share of GDP, transportation spending share of GDP, defense spending share of GDP), the superscript *j* is an *GDP cycle index* (*j*=GDP acceleration, GDP deceleration). The list of variables is as follows: s_{ii}^{k} public spending of type *k*, $s_{i,t-1}^{k}$ is its lagged level, g_{ii}^{j} is the GDP cycle variable of type *j*, the term $g_{ii}^{j}q_{ii}$ is a cross term of the key explanatory variable *g*_{*i*,*i*} (economic growth acceleration or deceleration) and the quality of governance variable of our choice, which in this case is "control of corruption". The last two variables are what the study is interested in, so we mainly examine the coefficients β_2 and β_3 . x_{ii} is a row vector that consists of the most commonly used control variables in the literature, comprising a quality of governance variable, such as "control of corruption", foreign aid expressed share of GDP, and tax revenue share of GDP. D^{t} is a row vector of year-dummy variables and μ_i is a country fixed effect term. The method of fixed effects is designed to control for the unobserved country-specific time-invariant effects in the data.

In addition, we also turn to a dynamic panel estimator, in order to deal with endogeneity issues. The most widely used dynamic panel estimator is *Blundell-Bond GMM*, also known as the *system GMM estimator*. The system GMM is specifically designed to control for the joint endogeneity of some explanatory variables through the creation of a matrix of "internal" instruments, using lagged level observations as instruments for differenced variables and lagged differenced observations as instruments for level variables. In the case of our study, we would like to control for the endogeneity of regressors and another set to deal with the correlation between lagged dependent variable and the induced MA(1) error term.⁴ A necessary condition for system GMM to be implemented is that the error term is not serially correlated of second order, otherwise the standard errors of the instrument estimates grow without bound. For this reason, Arellano and Bond (1991) have developed a second order autocorrelation test, which we report in

⁴ For an application of Blundell and Bond see Levine, Loayza and Beck (2000) and Doytch and Uctum (2011).

the full regression tables.⁵ The standard GMM conditions of no second order autocorrelation in the error term:

- $E[s_{i,t-p}^k \ (\varepsilon_{it} \varepsilon_{i,t-1})] = 0$ for p ≥ 2 and t=3,....T
- $E[x_{i,t-p}(\varepsilon_{it} \varepsilon_{i,t-1})] = 0$ for $p \ge 2$ and t = 3,...,T
- $E[g_{i,t-p}^{j}(\varepsilon_{i,t}-\varepsilon_{i,t-1})]=0$ for p ≥ 2 and t=3,....T;

An additional necessary condition for the efficiency of the Blundell-Bond system GMM estimator is that, even if the unobserved country-specific effect is correlated with the regressors' levels, it is not correlated with their differences. The condition also means that the deviations of the initial values of the independent variables from their long-run values are not systematically related to the country-specific effects.

Variables of Interest

Business Cycle. One widely used indicator of the business cycle is the output gap, which is defined as the difference between the trend GDP and actual GDP. While useful, the output gap does not measure sustained and severe periods of contraction (or expansion) episodes. Very short upturns or downturns may be associated with more muted effects on public spending, given that governments may be able to adjust policies in the very short term. Since most other earlier studies on this topic used indicators that do not capture protracted upturns or downturns, it is possible that this helps explain why these studies were unable to capture strong patterns. Thus we turn to the literature on growth acceleration and deceleration episodes, and we use indicators of these as possible proxies for very acute and protracted swings in the business cycle. Following the approach by Conceicao and Kim (2010), we consider the dummy variables for growth acceleration or decelerations and decelerations. The specific parameters describing a growth acceleration or deceleration episode are contained in Annex 3 in this paper.

Governance. Both stylized facts and empirical evidence suggest that the quality of governance may affect the fiscal decision made by the government (e.g. Gupta et al. 1999; 2002; Mauro 1998). For example, in countries with weaker indicators of governance, public expenditure may be biased towards some sectors that are more conducive to rent-seeking or are the subject of more

⁵ By construction, the differenced error term is first-order serially correlated even if the original error term is not.

intense lobbying. On the other hand, the social sectors may tend to receive relatively less emphasis, particularly if poor and low income people are unable to organize themselves to lobby more effectively for better quality and quantity of public services (Lustig 2000). Weak institutional capacity and corruption can also diminish the effectiveness of any given amount of resources allocated to the social sector. Even if the public resources are allocated for social services, social spending may fail to be realized due to inappropriate execution and monitoring of the public budgeting process (Deles et al 2009).

Existing empirical studies on the pattern of social spending do not yet take governance indicators into account. We address this gap, by using an indicator for the quality of governance based on the indicators in the Inter-Country Risk Guide published by the Political Risk Group. As mentioned earlier, in countries with weak institutions, it is much less likely that adequate resources will be allocated to the social sectors, and even resources that do get allocated may not necessarily be channelled most effectively through the government bureaucracy and into social investments items such as textbooks, school construction, and medical supplies. Better quality of governance is represented by a higher value taken by the indicator. For example, a higher value of the corruption indicator implies better control of corruption by the government. We include an interaction term between the growth acceleration/deceleration variable and the control of corruption variable, in order to examine whether the presence of lower corruption may be associated with a more countercyclical social spending response. As a robustness check, we also turn to an analysis of other governance indicators, i.e. government stability and bureaucratic quality, but these do not materially change the main finding that there is very little evidence that social spending in education and health are countercyclical in developing countries.

Fiscal Space. The approach controls for other economic factors that affect fiscal space or the scope and ability of governments to implement their fiscal policies. These factors include: foreign aid as share of GDP, portfolio investment in bonds and equity as share of GDP, net foreign transfers from abroad as share of GDP, and tax revenue as share of GDP. Among these control variables, foreign transfers may not only have an income effect on the fiscal capabilities of the recipient country, but also influence the prioritization of public spending. Therefore, such variables related to fiscal space are potential determinants of public social spending. For instance, Hagen and Hatlebakk (2002) find that the most generous bilateral donors have a significant impact on the budget shares of social sectors using targeted aid. In addition, it is often the case that when macroeconomic adjustments are necessary, notably during crises, more conservative

policy options are chosen, with the effect of limiting the resources for social spending (Center for Global Development 2007).

Apart from the above factors, it is also likely that there are other economic or political determinants of fiscal choice, such as regime and political transitions. In the case of military spending, we considered additional control variables. We turned to data on "Major Episodes of Political Violence" (MEPV) compiled and reported by the Center for Systemic Peace. The level of political violence is judged by magnitude on a scale of 0-10; and each country is given this 0-10 score for various categories such as ethnic violence, civil war, interstate war, etc. Then these scores for different types of conflict are added together to create a "total sum magnitude" of all political violence. This is the variable used to correct for the possible context-specific need for relatively higher military or defense spending. A variable summing the total MEPV for all countries in the region is also used as a control in a separate regression. The logic there is that countries living in a more dangerous regional neighborhood may need to spend relatively more on defense and the military.

4. EMPIRICAL RESULTS

Tables 1 and 2 summarize the results for the regressions with total public spending, public spending in education, health, agriculture, social protection, transportation and military as the dependent variables, with the growth acceleration and deceleration episodes serving as the main indicators of the business cycle. Table 1 presents the results using the panel fixed effects method of estimation, while Table 2 contains the results using the GMM methodology. Only the main variables of interest are reported in Tables 1 and $2.^{6}$

Focusing first on total public spending, the results show that this is acyclical for growth accelerations, but procyclical for growth decelerations—that is, total public spending tends to decline during severe and sustained downturns (See Table 1:R1 and Table 2:R8). Under these conditions, it is interesting to note that the rest of the results suggest that components of total public spending do not necessarily decline, even as the entirety of total public spending does.⁷

A scan of the over-all results for growth acceleration episodes in Tables 1 and 2 suggests that most of the public spending components tend to be acyclical, with the exception of public spending in education and public spending on transportation, both of which are countercyclical

⁶ The full regression results are available from the authors upon request.

⁷ It should be noted that these categories of spending do not encompass total expenditure. Up to and in some instances slightly more than 50% of total expenditure is not included in any of these sectors and is categorized as "Other" by IFPRI.

during acceleration episodes for the fixed effects estimates (See Table 1:R2 and R6). However, for the GMM estimates, these two spending items are also acyclical. Hence, we find very little evidence that growth accelerations are accompanied by procyclical policies. And in addition, there is some evidence under conditions of better control of corruption and good governance, that any procyclicality in total public spending and public spending in transportation is further tempered (See Table 2:R8 and R13).

On the other hand, focusing on deceleration episodes, the results seem more pronounced. As noted earlier, total public spending is negatively associated with growth deceleration episodes. However, certain subcomponents of total public spending do exhibit countercyclical patterns despite the fact that total public spending appears procyclical. There is evidence that public spending on education, agriculture, social protection and transportation all display a countercyclical response to economic downturns (See Table 1:R4 and table 2:R9, R11, R12, R13).⁸ Indeed, only public spending in health and military spending both display acyclical patterns during both acceleration and deceleration episodes. These results are richer and differ from those of earlier studies such as Arze del Granado, Gupta and Hajdenberg (2010). These authors examined output gaps, and they found evidence of procyclicality in education and health only during positive output gaps (and for negative output gaps they found acyclicality). It is possible that one reason for the difference may have to do with the different size of the sample as well as the difference in model specification. In our model, we account for governance which is a key indicator recognized in the literature in public spending (See for instance Abed and Gupta 2002; Gupta et al. 1999; 2002; Mauro 1998).

However, we also suspect that the largest factor behind the difference in findings is because we used indicators for more protracted episodes of the business cycle. This empirical strategy offers a much stronger basis for assessing the government's true responsiveness vis-a-vis the business cycle since a protracted episode makes it less likely that governments are able to smooth out their spending through minor adjustments in their public finance policies. Our model specification is better equipped to capture stronger pressure (if any) on public spending allocations.

In addition, it also seems that better governance tempers the procyclicality in total public spending during growth downturns (See Table 1:R1 and table 2:R8). This coheres with the findings in the literature that governments with strong public finance management systems and lower prevalence of corruption, rent-seeking and other government failures tend to be able to

⁸ The results for public spending in education conform with our earlier results in Doytch, Hu and Mendoza (2011), using output gap as the business cycle indicator.

manage fiscal policy better over the business cycle (e.g. Abed and Gupta 2002). However, there is less evidence that it tempers procyclicality during growth accelerations.

On the other hand, one curious finding is that in countries with better governance and during growth decelerations, the countercyclical public spending pattern in agriculture, social protection and transportation tends to be relatively lower (See Table 2:R11, R12, R13). There are several possible explanations for this. One may lie in the differences in the public-private mix in economies with better governance-these economies may also tend to develop more robust private sectors, thus mitigating the need for a stronger countercyclical public sector response. It is also possible that in countries with better governance, much more can be achieved by the public sector with far less, due to better information, more well planned systems, lower leakages and lower incidence of waste and inefficiency in the government bureaucracy. This further suggests that the countercyclical public spending response may not necessarily need to be large. Indeed, recent anecdotal evidence to this effect was observed during the last global crises of 2008-2010. Countries that had more well developed social protection systems appeared to spend more efficiently and more effectively, whereas those without may have had to spend on blanket-and often very expensive—measures such as subsidies for food and other sectors in the economy.⁹ Until better indicators of these factors are developed, this remains an area to be revisited in follow up studies.

Finally, the regressions examining public spending on the military vis-a-vis growth accelerations and decelerations produced less compelling results. Military spending seemed to be largely acyclical in its pattern. The governance interaction did not produce statistically significant results, counter to what was expected.

⁹ For a discussion, see Mendoza (forthcoming).

Table 1. Summary Table of Regression Results	
Panel Fixed Effects Methodology	

	R1	R2	R3	R4	R5	R6	R7
	Total Public Social Spending %GDP	Public Spending on Education % GDP	Public Spending on Healthcare % GDP	Public Spending on Agriculture % GDP	Public Spending on Social Protection % GDP	Public Spending on Transportation %GDP	Public Defense Spending % GDP
Model Using Growth Acceleration	/Deceleration	as Indicator of	f the Business	Cycle			
Acceleration	4006	421*	293	052	1.742	447**	347
	(-0.27)	(-1.76)	(-1.00)	(-0.30)	(1.62)	(-2.02)	(-0.79)
Acceleration*Control of	252	.115	.019	041	747	.120*	.079
Corruption	(-0.47)	(1.39)	(0.15)	(-0.47)	(-1.55)	(1.87)	(0.45)
Deceleration	-9.905***	785	.267	.701*	361	.041	0.428
	(-3.38)	(-1.56)	(0.60)	(1.95)	(-0.30)	(0.14)	(1.41)
Deceleration*Control of	4.178***	.139	168	241	.007	087	097
Corruption	(3.92)	(0.94)	(-1.21)	(-1.49)	(0.02)	(-0.71)	(-0.30)
Number of countries	40	40	40	40	40	40	39
Number of observations	338	338	338	338	338	338	328
• R-sq statistic	0.3080	0.2709	0.1490	0.1818	0.1268	0.1328	0.3825

Source: Authors' synthesis of regression results.

Table 2. Summary Table of Regression Result	S
GMM Methodology	

	R8	R9	R10	R11	R12	R13	R14	R15
	Total Public Social Spending %GDP	Public Spending on Education % GDP	Public Spending on Healthcare % GDP	Public Spending on Agriculture % GDP	Public Spending on Social Protection % GDP	Public Spending on Transportation and Communication % GDP	Public Spending Defense % GDP (Home country Conflict Control)	Public Spending Defense % GDP (Regional Conflict Control)
Model Using Growth Acceleration	/Decelerati	on as Indica	tor of the Bus	siness Cycle				
Acceleration	.139 (1.29)	.175 (0.97)	044 (-0.17)	.065 (0.25)	.272 (0.50)	.499 (1.20)	.078 (0.41)	065 (0.45)
Acceleration*Control of Corruption	057* (-1.69)	096 (-1.44)	.014 (0.02)	094 (-1.16)	045 (-0.23)	259* (-1.69)	025 (-0.33)	009 (-0.17)
	(,					()	(/	
Deceleration	325** (-2.21)	.436* (1.84	.225 (0.52)	1.439** (1.97)	2.103*** (3.55)	2.433** (2.48)	.532 (1.29)	.130 (0.33)
Deceleration*Control of Corruption	.112* (1.78)	100 (-1.29)	079 (-0.41)	614* (-1.92)	840*** (-2.85)	-1.031** (-2.59)	251 (-1.28)	136 (-0.68)
 Number of countries Number of observations AR(2) Arellano-Bond test 	40 324 0.636	40 324 0.377	40 324 0.302	40 324 0.270	40 324 0.569	40 324 0.738	39 316 0.156	39 316 0.220

Source: Authors' synthesis of regression results

5. CONCLUSION

This paper examined public spending and investments in various sectors of the economy and how these behave over the business cycle. Key social, economic and military sectors examined include agriculture, education, health, social protection, transportation and the military, using available public spending data for up to 40 developing countries spanning the period from 1980 to 2004. As a potential innovation in the literature, we utilized indicators for growth acceleration and deceleration periods, in order to tease out possible patterns of public spending over these pronounced episodes in the business cycle. This differs from all earlier approaches that rely on indicators of the business cycle like the output gap or GDP growth. These earlier studies will probably not capture acute pressures that are likely to arise during pronounced episodes of growth or contraction. Unlike earlier studies, this study also accounted for the possible impact of the governance environment, which is recognized now in the public spending literature as a key factor that could influence public spending patterns.

An over-all assessment of the empirical results in this paper would suggest the following. First, total public spending is largely procyclical during growth decelerations and it is acyclical during growth accelerations. Second, better governance indicators are associated with a tempering of this procyclicality of total public spending. Third, even as total public spending may be procyclical, its subcomponent parts need not be. Indeed, public spending on education, agriculture, social protection and transportation all display countercyclical patterns during growth decelerations. This is tempered somewhat under conditions of better governance, and the reasons for this may have to do with the public-private balance in these sectors. This is an interesting area for future study. Finally, military spending tends to be acyclical, suggesting that it neither gets cut nor surges systematically during growth accelerations or decelerations, at least for the sample of countries studied herein.

These findings reinforce the call for policymakers to manage public finances during crises, in ways that help preserve critical investments in the social sectors. Even under conditions of tightening public sector spending, it is still possible to preserve—if not boost—social sector spending, as seems to be indicated in this paper's findings, at least in certain social sectors like education and social protection. Examining the reasons why other aspects of social sector spending, including health spending, does not appear to be boosted during downturns is an area for future research.

In addition, future work could build on the empirical analysis in this paper by expanding the dataset in two main directions. First, it is critical to include more countries in the analysis in order to be able to tease out patterns that may differ across country groupings or regions. At present, the sample is too small to be able to do this meaningfully. Second, it would also be useful to begin to disaggregate each sector's public spending to be able to examine the relative sensitivity of component parts of sectoral spending and investments. Are salaries the most vulnerable to cuts? Do capital investments suffer disproportionately more across sectors? If spending is boosted during economic downturns, which sectors and what line items receive the most allocations? Answers to these questions could help inform policymakers and the public on whether or not and how best support to the social sectors can be undertaken. This will enable countries to manage and channel resources much more effectively throughout the best and worst points of the business cycle.

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Africa (6)	Asia (19)	LAC (9)	Europe (6)
Botswana	Azerbaijan	Bolivia	Czech Republic
Egypt, Arab Rep.	Bahrain	Brazil	Estonia
Ethiopia	Bangladesh	Costa Rica	Hungary
Ghana	China	Dominican Republic	Lithuania
Kenya	Iran, Islamic Rep.	El Salvador	Poland
Uganda	Israel	Guatemala	Romania
	Jordan	Mexico	
	Kazakhstan	Panama	
	Korea, Rep.	Uruguay	
	Kuwait		
	Oman		
	Pakistan		
	Philippines		
	Singapore		
	Sri Lanka		
	Syrian Arab Republic		
	Thailand		
	Turkey		
	United Arab Emirates		

Annex 1. Countries Covered in this Study

Variables (All in %GDP)	Mean	Standard Deviation	Minimum	Maximum	Number of Observations
Public Spending Agriculture	.9980885	.9911603	1.10e-08	10.5826	976
Public Spending Education	3.550176	2.370358	.17124	21.212	960
Public Spending Health	1.635965	1.461923	1.10e-08	11.8045	976
Public Spending Defense	3.721711	4.268059	3.30e-08	48.4167	942
Public Spending Social Protection	2.643479	3.227801	4.40e-08	19.7378	968

Annex 2. Descriptive Statistics

Annex 3. Episodes of Growth Acceleration and Deceleration

The definition of growth acceleration and deceleration follows Arbache and Page (2007). In particular, a growth acceleration is a period that satisfies the following four conditions:

- Condition 1 The forward four-year moving average growth minus the backward four-year moving average growth > 0 for a given year; i.e., the forward moving average window (t, t+1, t+2, t+3) must be higher than the backward window (t, t-1, t-2, t-3) and above 0;
- Condition 2 The forward four-year moving average growth exceeds the country's average growth, meaning that the pace of growth during acceleration is higher than the country's trend;
- Condition 3 The forward four-year moving average GDP per capita exceeds the backward four-year moving average;
- Condition 4 A growth acceleration episode requires at least three years in a row satisfying conditions 1-3. An episode includes the three subsequent years after the last year that satisfies conditions 1-3.

A growth deceleration is a period that satisfies the following four conditions:

- Condition 1 The forward four-year moving average growth minus the backward four-year moving average growth < 0 for a given year;
- Condition 2 The forward four-year moving average growth is below the country's average growth;
- Condition 3 The forward four-year moving average GDP per capita is below the backward four-year moving average;
- Condition 4 A growth deceleration episode requires at least three years in a row satisfying conditions 1-3. An episode includes the three subsequent years after the last year that satisfies conditions 1-3.

If neither of two sets of conditions applies, a period is considered as a "neutral" period. Condition 1 identifies a kink in growth trend. If the forward average growth is higher than the backward average growth, the year is considered to be in an acceleration phase. If the sign of the difference in averages changes from positive to negative, or vice versa, it suggests a shift in growth trend. Condition 2 eliminates the long term growth trend component, especially in countries with very low or very high growth rates for a number of years. Condition 3 considers the level of GDP, not the annual growth rates, to separate the growth acceleration episode from a part of recovery from a recession. Condition 4 ensures the episode is not a temporary phenomenon for a couple years, but a significant deviation from the underlying trend.

Source: Conceicao and Kim (2010:1-2).