

Public size and Economic Growth relationship: can a better institutional quality fix the outcomes?

Muhammad KHAN (Corresponding Author)

*Laboratoire d'Economie d'Orléans (LEO), Université d'Orléans, Rue de Blois BP : 26739,
45067 – Orléans Cedex 2, France.*

E-mail: muhammad.khan@etu.univ-orleans.fr

Phone Number: 0033 (0)6 01 79 13 15

Shumaila Zareen

Department of Management Sciences, IQRA University, H-9 Islamabad, Pakistan.

Shumaila.zareen@iqraisb@edu.pk

Phone Number: 0092 (0)3245148674

Abstract

This paper highlights two aspects of the public size and economic growth relationship. First, we test the functional form of the relationship for a large panel of 135 developed and emerging economies over the period 1996-2014. Second, we highlight the role of certain institutional characteristics in moderating the sensitivity of the relationship between the two variables. Our empirical results, based on system GMM and rolling regression models confirm an inverse U-shaped relationship between public size and economic growth. Moreover, we note that the adverse effects of excessive public size are stronger for economies with weak level of institutional quality.

JEL classification codes: E02, H50, O43.

Keywords : Public Size, Institutions, Economic Growth.

1. Introduction:

The role of public spending in long-run economic growth has long been debated in the literature.¹ Currently, the topic became increasingly important since both developed and emerging economies are facing new challenges to meet their fiscal requirements. In the developed economies, the concern arises from several factors including their growing public debt, high welfare related expenses and low tax collections – resulting from population aging. In the developing countries, huge public size is required to provide basic infrastructure and initiate risky projects that are not undertaken by the private sector. While all these factors necessitate large public spending in the both groups, the issues related to sustainability and optimality of these heavy public sizes remain open for both political and academic discussions.

Economic theory presents opposing views on the relationship between public size and economic growth. On the one hand, public spending is considered necessary for the provision of infrastructure and protection of property rights, while, on the other hand, a heavy public size reduces efficient private investment and increases distortionary taxes (Christie, 2014). Both of these competing effects suggest heterogeneity in the relationship between public spending and economic growth depending upon the level of public size. However, the empirical testing of different aspects of this relationship remains less explored in the literature. The studies testing this relationship have either opt for a linear functional form (see Ram, 1986; Grier and Tullock 1989; Afonso and Furceri, 2008) or address the question of non-linearity improperly. On the latter, most of the studies either introduce quadratic term by assuming a specific functional form of this non-monotonic relationship (Kelly, 1997; Park, 2006) or exogenously determine the threshold (Sheehey, 1993). Moreover, a majority of previous studies analyze this nexus in a country-specific environment and therefore do not focus on the cross-sectional dimension of this relationship. The studies addressing the nonlinearity in a panel framework include the works by Karras (1996), Varoudakis et al., (2007) and Christie (2012). Among these authors Karras (1996) focuses on the productivity of public spending for 20 European economies while Varoudakis and others (2007) report a nonlinear functional form of this relationship for a small sample of 25 transition economies. Christie (2012) studies this issue for 136 economies over the period 1971-

¹See Section 2 for survey.

2005 and particularly focuses on the role of productive and nonproductive spending in altering the nature of this relationship.

Besides, a majority of the earlier studies focus on testing the direct relationship between the two variables and ignore the fact that both the nature of this relationship as well as its sensitivity – due to changes in public size – can be influenced by the quality of governance. To illustrate, the adverse effects of public size on economic growth are modified through better governance quality since the latter allows more transparency of these spending.² A stable political environment, for example, assures long-term sustainability of public size and thereby, weakens the adverse effects of public expenditures on growth. Similarly, the other macroeconomic institutional characteristics e.g., government effectiveness and regularity quality can also alter the nature of relationship between the two variables. The existing literature, nonetheless, does not study the role of these conditional variables in modifying the public size and economic growth nexus. Our paper fills all these gaps of the existing literature by taking a large sample of 135 developed and emerging economies and by analyzing the role of governance quality in moderating the nonlinearity between public size and economic growth relationship.

On the methodological fronts, the results can be influenced by endogeneity and reverse causality issues. A better performance on the growth side can also motivate the policymakers to assume extended fiscal role, causing feedback effects from growth to public spending. We use system GMM to account for this problem. Moreover, for a continuous threshold analysis of the public spending variable and the other institutional variables, we run rolling regression models. A main advantage of this technique is that it allows the determination of an optimal threshold identified among a wide range of potential thresholds. The obtained coefficients, therefore, reflect the effect of public size on growth with relatively homogeneous sub-samples of public size (or the other conditional variables). Our main results confirm a nonlinear relationship between public size and output growth. The optimal level of public size is around 20%. Below this level, public size enhances output growth and above this level, it reduces the latter. Our findings on the conditional variables show that the adverse effects of public size are largely moderated by the good quality institutions.

²Throughout the text, we use the words institutions and governance interchangeably.

The rest of the paper is organized as follows. Section 2 summarizes some important previous research and provides a brief discussion of the role of institutional quality on the public size–growth relationship. Section 3 presents our proposed models and the data set. Section 4 presents our main empirical findings. Lastly, Section 5 offers conclusions.

2.1. Review of Literature:

2.1.1. Public size and Growth:

In the growth literature, an active role of government in assuring full employment dates back at least as early as Keynes when the author notes, “the central controls necessary to ensure full employment will of course involve a large extension of the traditional functions of government” (Keynes, 1933, p.379). The subsequent studies supporting Keynes, include Ram (1986) and Kormendi and Meguire (1986) who report a positive connection between public size and economic growth. These authors maintain that a heavy public size not only ensures the availability of public goods but also provides insurance function to private investment. However, a parallel school of thought argues that higher public size reduces the return of government expenditures and crowds out productive private investment (see Landau, 1983: Engen and Skinner, 1991). The adverse effects of large public size are also assumed to appear through increasing level of distortionary taxes that are necessary to support these spending (Chen and Lee, 2005).

Another stream of theoretical literature argues that both of these opposing effects of public expenditures are actually present at different levels of the public spending. Proponents of this school support an inverted U-shaped relationship between public spending and GDP growth (see Barro, 1990: Armeij, 1995: Rahn and Fox, 1996 and Scully, 1995). Among these studies, Armeij uses the rationale of diminishing factor returns, and argues that in the beginning when government size is close to zero, additional public spending is necessary for the provision of legal, administrative and governance infrastructure and, to account for market failure. By contrast, when government size exceeds certain levels, undue public expenses cause more taxes and increase the level of public debt, and money supply (Asimakopoulos and Karavais, 2015).

Consistent with the advancements in theoretical literature, the empirical literature on the subject supports all the possibilities of positive, negative and nonlinear relationship between

public size and economic growth.³Using a linear functional form, Dar and AmirKhalkhali (2002), Bergh and Karlsson (2010) and Guseh (2007) find negative impact of public spending on growth whereas Bose et al., (2007) and Romero-Avila and Strauch (2008) report positive connection between the two variables. Besides, some authors test the nonlinear relationship between these variables using country-specific data set. The examples include Scully (1994) who note that the optimal tax rate for the U.S economic growth ranges between 21.5% to 22.9% of the GDP (see also Chao and Grubel, 1998). Rezk (2005) and Facchini and Melki (2001) also find inverted U-shaped relationship for Argentinean and French economies, respectively. Both these studies report 30% level of public size to be optimal for the selected economies.

2.1.2. Governance, public size and economic growth

The role of institutions as major drivers of economic development has gained prominence in the mainstream economic literature (Acemoglu et al. 2004; Acemoglu, Johnson, and Robinson, 2002; Hall and Jones 1999; Rodrik 2000). North (1990) defines institutions as the “rules of the game in a society, or, more formally...the humanly devised constraints that shape human interaction. Institutions provide the incentives structure, therefore, investment in accumulation of inputs and technology leads to higher productivity enabling the economies with better economic institutions to grow faster. In consequence, they structure incentives in human exchange, whether political, social or economic (North, 1991).”

Turning to the role of better quality institutions in enhancing the long-run growth, a considerable attention has been paid to the subject during the recent decades. Institutional theory highlights the importance of institutions for growth as they allow the development of an ordered and more transparent environment, which reduces uncertainty and spurs trade. Economists distinguish between economic institutions (e.g., property rights, contracts, patent laws) and political institutions (e.g., democratic vs non-democratic system, electoral rules, and regulations). Both these types of institutions are assumed to contribute to higher productivity and growth (Rigobon and Rodrik, 2005). On the other hand, poor institutions containing cumbersome bureaucracies cause delay in the developments of new products and slow down the diffusion and implementation of new technologies (Mauro, 1998).

³See Grossman (1990) for a summary of literature on all these opposing lines.

North and Thomas (1973) argue that countries with strong 'institutions' and well defined property rights tend to invest more in human and physical capital accumulation and also, manage a better utilization of both these factors of production for their objectives of rapid output growth. The subsequent studies empirically supported this view by using macro-based cross country correlations between property rights and output growth (Knack and Keefer, 1995) and also some micro level studies between property rights and investment (Besley, 1995). Some other examples on this positive institutions–growth relationship include the works by Jones(1981); Acemoglu et al.,(2001); Rodrick(2002) and Eicher and Leukert(2009).

Acemoglou et al., (2001) argue that institutional differences across the developing countries that mainly appear due to preferences of their colonial powers explain the differences in per capita GDP during the post-colonization era. Beck and Laeven (2006) also consider institutional development as key factor in explaining the growth differences among the Eastern and Central European and Central Asian states. The authors note that countries with more influence of socialist government and relatively heavy reliance on natural resources focused less on institutional development and consequently performed poorly on the growth fronts. Eicher and Leukert (2009) report significant role of the economic and political institutions in determining the economic performance of developed and developing economies. Developing on the 'hierarchy of institutions hypotheses' (see Acemoglu et al., 2005), the study documents that in developing economies where political institutions are lacking, the role of economic institutions is less strong.

In addition to these direct effects of institutions on growth, a better institutional quality also ensures efficient use of public money and thereby moderates the adverse effects of public spending on growth. To Pushak and Vourdakakis (2007), better institutional quality affects both the costs and benefits of public size. The marginal benefit of a given public size increases through better program design and service delivery whereas the marginal cost goes down as better tax administration and tax policy can raise revenues in less distortionary ways. Kleven (2014)takes the case of Scandinavian countries which have better economic performance despite their large public sizes and tax rates. The study highlights the role of better quality social institutions e.g., trust, social capital, ethnic homogeneity, in explaining the success in Scandinavian countries. All this implies that better institutional quality can modify the effect of public spending on economic

growth. However, a precise estimation of the role of institutions remains an open question in the empirical growth literature.

3. Empirical models and data

3.1. Empirical models

In order to estimate the non-linear public expenditures and output growth relationship and, to test its sensitivity with respect to different country-specific institutional characteristics, we rely on different econometric models. In the first step, we estimate panel regressions with interaction term variables by using both fixed effects and Generalized Methods of Moments (GMM) models. In the second step, we conduct a rolling regression analysis to see how coefficient of public size variable evolves at different levels of government expenditures (or the institutional variables). A basic structure of our panel equation for government size and output growth can be expressed as:

$$y_{it} = \alpha_0 + \alpha_1 G_{it} + \alpha_2 X_{it} + \alpha_3 Z_{it} + \alpha_i + \rho_t + \varepsilon_{it} \quad (1)$$

here y_{it} represents growth rate of per capita income, G_{it} shows public size, X_{it} explains institutional variables and Z_{it} includes some other growth covariates such as investment, human capital and population growth. The last two parameters α_i and λ_t represent country and time fixed effects, respectively. Besides, in order to incorporate the modifying role of governance variables, we include an interaction term in the above model and obtain the following form:

$$y_{it} = \alpha_0 + \alpha_1 G_{it} + \alpha_2 X_{it} + \alpha_3 Z_{it} + \alpha_4 G_{it} X_{it} + \alpha_i + \rho_t + \varepsilon_{it} \quad (2)$$

Equation (2) includes an additional interaction term to account for nonlinear growth effects of the public expenditures variable. Following our theoretical reasoning, the interaction term shows moderating effects of governance indicators for countries with better level of institutional quality. For our first step estimation, when we are interested to check the non-linearity of public size variable, marginal effects of public size on output growth can be calculated by examining partial derivative of y_{it} with respect to G_{it} .

$$\frac{\partial y_{it}}{\partial G_{it}} = \alpha_1 + 2\alpha_4 G_{it} \quad (3)$$

The marginal effect for a unit change in public size depends not only on α_1 and α_4 but also on the actual value of G_{it} . Moreover, as we expect negative sign of α_4 variable, the overall

relationship takes inverted U-shaped profile. The solution of equation (3) also gives an optimal rate of public size.

This fixed effect model is not our preferred specification due to the fact that a high growth can also trigger generous public spending on welfare resulting in a reverse causality problem. In order to test the robustness of our result with respect to this problem we estimate a system GMM model consisting of the stacked regressions in levels and differences (Arellano and Bover, 1995; and Blundell and Bond, 1997). The system-GMM method computes a system including first differenced equation to account for country-fixed effects and then an additional equation in levels. The consistency of the GMM estimator depends on two things; the validity of the assumption that the error term does not exhibit serial correlation (AR1) and the validity of the instruments (AR2).

For a more continuous and robust investigation of this nonlinearity of the public expenditures and output growth relationship, a rolling regression technique has been adopted. The main advantage of this method is that it shows the behavior of inflation coefficients with increasing level of inflation rate. This makes it a smooth approach to analyze the nonlinearity.⁴ To conduct this analysis, all of the observations in the data set are arranged in ascending order of public size and other institutional variables and then a constant window of 120 observations is employed to get the public size coefficients.

3.1.2. The Data:

Our selected data set is based on annual observations from 135 developed and emerging economies over the period 1996-2014. The choice of this sample period is mainly driven by the availability of information on the institutional quality variables. The tripartite institutions, government expenditures and growth relationship is estimated using the growth rate of per capita income (ΔY_{it}), four indicators of quality of institutions (namely, control for corruption, political stability, government effectiveness and regularity quality) and public expenditures as percentage of GDP (G_{it}). The other macroeconomic indicators selected here include, ratio of gross fixed capital formation to GDP (I_{it}), average years of schooling for the population of age 15 and older

⁴See Rousseau and Watchel, 2002 and Yilmazkuday, 2012 for a more detailed discussion.

at primary level of education (HC_{it} : see Barro and Lee, 2010) reflecting the human capital accumulation and population growth (ΔP_{it}).

Table 1: Descriptive Statistics, 1996-2014

	Mean	Std. Deviation	Minimum	Maximum	Observations
GDP Growth	0.022	0.048	-0.973	0.716	2427
Public Size	15.471	5.421	2.047	39.582	2470
Human Capital	0.001	0.285	-1.219	1.763	2584
Physical Capital	21.861	6.365	-2.424	74.821	2442
Population. Growth	1.456	1.543	-3.821	17.625	2599
Control for Corruption	-0.061	0.945	-2.99	1.67	2603
Political Stability	0.036	0.991	-2.23	2.12	2603
Government Effectiveness	0.1559	0.931	-2.41	2.25	2603
Regularity Quality	0.122	0.984	-2.03	2.43	2603

All of our selected variables have been considered robust determinants of output growth by the previous literature (see López-Villavicencio and Mignon, 2011). Concerning the expected sign of these covariates, the empirical growth literature has struggled in fixing the exact nature of the relationship between GDP growth and some of its covariates like public size and population growth (Levine and Renelt, 1992). For instance, a high population growth diminishes the existing stock of capital per worker (Solow, 1956). Nevertheless, a better skilled population can also complement the growing capital stock and enhance the output growth. Data on all the selected variables, except human capital stock, has been retrieved from World Bank's *World Development Indicators* (WDI); available online.⁵

⁵The selected 135 countries include Albania, Algeria, Argentina, Armenia, Australia, Austria, Bahrain, Bangladesh, Barbados, Belgium, Belize, Benin, Bolivia, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burundi, Cambodia, Cameroon, Canada, Chile, China, Colombia, Congo, Dem. Rep., Congo, Rep., Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Estonia, Fiji, Finland, France, Gabon, Gambia, The, Germany, Ghana, Greece, Guatemala, Guyana, Haiti, Honduras, Hong Kong SAR, China, Hungary, Iceland, India, Indonesia, Iran, Islamic Rep., Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Korea, Rep., Kuwait, Kyrgyz, Republic, Lao PDR, Latvia, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Macedonia, FYR, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Rwanda, Saudi Arabia, Senegal, Serbia, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Sudan, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, RB, Vietnam, Yemen, Rep., Zambia and Zimbabwe.

Table 1 shows the summary statistics for all these variables. Focusing on the summary statistics, we observe large variation in all the selected variables. For instance, the log values of GDP growth vary from -0.97 percent to 0.71 percent. Public size varies from merely 2.04 to 39.58 percent of GDP in our selected economies. Similar patterns are observed with respect to human and physical capital accumulation, the latter varies from -2.424 to 74.821 percent of GDP. In case of institutional variables, both standard deviation and range are almost same in the selected economics. Finally, for most of the variables including GDP growth, human capital, population growth and institutional variables, the standard deviation exceeds their respective mean values.

4. Results and discussion:

Table 2 presents our main results on the functional form of public size and output growth relationship. These results generally speak about the nature of relationship between the two variables and some structural breaks in this relationship. Our benchmark models use panel regressions with time- and country-specific effects. Focusing on the specification 1, it shows a positive effect of human capital on the long-run growth of the selected economies. This is in line with the suggestions of human-capital theory where better human capital enhances output growth (Becker, 1964; Schultz, 1981) through allocative efficiency, adoption of modern technologies from the advanced countries and thus, improvement in the absorptive capacity of ‘follower’ countries (Nelson & Phelps, 1966). These results are also in line with previous empirical literature on the subject (see Romer, 1990; Barro, 1991). Our next covariate, physical capital accumulation, also appears significant with positive sign. The growth theories, starting from the neo-classical Solow (1956) growth model, support a vital role of higher physical capital stock for output growth.

Table (2): Fixed Effects and GMM Models for Institutions, Government Expenditures and Growth 1996-2014

Dependent Variable	<u>Public Size</u>		<u>Political Stability</u>		<u>Control for Corruption</u>		<u>Regularity Quality</u>		<u>Quality of Governance</u>	
	(1) F.E	(2) GMM	(3) F.E	(4) GMM	(5) F.E	(6) GMM	(7)F.E	(8) GMM	(9) F.E	(10) GMM
GDP Growth (PC)										
Human Capital	0.017*** (0.004)	0.003 (0.003)	0.017*** (0.004)	0.006** (0.003)	0.016*** (0.004)	-0.002*** (0.000)	0.017*** (0.004)	0.003*** (0.000)	0.017*** (0.004)	0.002* (0.001)
Physical Capital	0.001*** (0.000)	0.003*** (0.001)	0.001*** (0.000)	0.003*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)
Pop. Growth	-0.006*** (0.002)	0.000 (0.001)	-0.006*** (0.002)	0.000 (0.003)	-0.006*** (0.002)	-0.006*** (0.000)	-0.006*** (0.002)	-0.002*** (0.000)	-0.006*** (0.002)	-0.002** (0.001)
Public Size	0.004 (0.002)	0.013*** (0.003)	-0.001*** (0.000)	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.000)	-0.002*** (0.001)	-0.002*** (0.000)	-0.002*** (0.001)	-0.002*** (0.000)
Public Size ²	-0.000** (0.000)	-0.000*** (0.000)								
Political Stability	0.010*** (0.003)	-0.000 (0.003)	0.022*** (0.008)	0.023** (0.012)						
Pol.Stability*Pub.Size			-0.001 (0.001)	-0.002*** (0.001)						
Corruption					0.039*** (0.010)	0.022*** (0.003)				
Corruption*Pub.Size					-0.002*** (0.001)	-0.001*** (0.000)				
Reg. Quality							0.035*** (0.010)	0.040*** (0.002)		
Reg.Qual.Pub.Size							-0.002*** (0.001)	-0.002*** (0.000)		
Governance									0.049*** (0.009)	0.045*** (0.006)
Governance*Pub Size									-0.003*** (0.001)	-0.002*** (0.000)
Constant	-0.095*** (0.029)	-0.188*** (0.033)	-0.049** (0.021)	-0.072*** (0.020)	-0.038* (0.022)	0.034*** (0.003)	-0.041* (0.022)	0.000 (0.000)	-0.034 (0.022)	0.000 (0.000)
Observations	2,274	2,274	2,274	2,274	2,274	2,274	2,274	2,274	2,274	2,274
R-squared	0.222		0.217		0.220		0.221		0.227	
AR(2)		0.18		0.11		0.10		0.12		0.12
No. of Countries	135	135	135	135	135	135	135	135	135	135

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

The population growth variable assumes a negative sign, reflecting the burden of overpopulation on the long-run growth of countries. A rapid population growth reduces the capital to labor ratio and thereby hinders economic growth. Mankiw et al. (1992) find that an increase in the population growth by 10 percent (e.g., from 3 percent to 3.3 percent) will reduce the steady state income growth by 5 percent. Nonetheless, an opposing view strongly supports a positive impact of population on output growth through higher demand for technological change and lower cost of innovations (see Aghion and Howitt, 1992; Romer, 1990). The standalone effect of institutional quality (political stability) variable is also positive. This supports North (1991) where better institutions generate incentives to invest in the accumulation of inputs and technology and therefore translate into higher growth. Acemoglu et al., (2001) argue that institutional differences across the developing countries that mainly appear due to the preferences of their colonial powers explain the differences in per capita GDP during the post-colonization era.

Next, the public expenditures variable appears with positive sign – though insignificant in this specification – whereas its squared term negative and significant. A moderate level of public spending is necessary to maintain law and order and run the other welfare programs. However, a massive public size arising from generous public spending on non-development sectors (e.g., debt servicing, defense, etc.) can reduce output growth (Barro, 1990). Further, a heavy size of public expenditures drains out the most efficient private investment and thus impedes growth (Barro and Sala-i-Martin, 1995). These results are complemented by our findings of specification 2, using the system-GMM model.⁶ The findings complement the previous empirical literature that reports non-monotonic functional form of the public size and output growth relationship (Friedman, 1997).

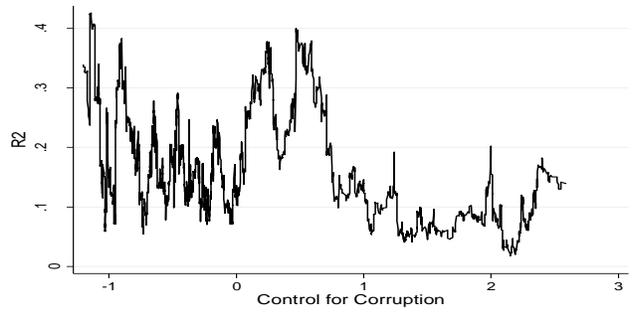
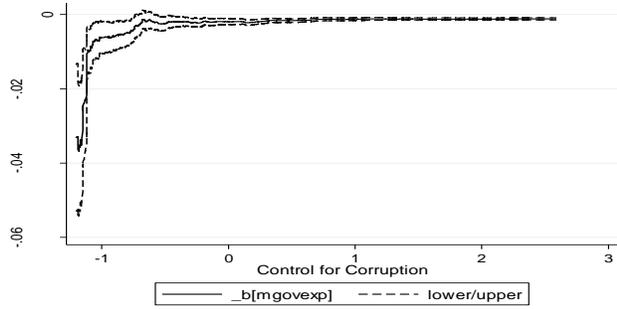
After establishing the inverse U-shaped public size and output growth relationship, the next task is to determine the factors that could possibly influence the sensitivity of this relationship. To this end, the specifications 3-10 of Table 2 highlight the role of different institutional quality indicators. The results of all these models are in line with our prior expectations. Public size appears with negative size and institutional quality with positive sign.

⁶Similar functional forms of the relationship were obtained for the two sub-samples; OECD and non-OECD countries. The results of these specifications have not been reported here for brevity.

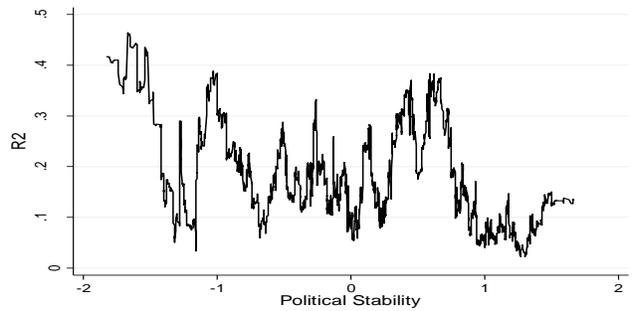
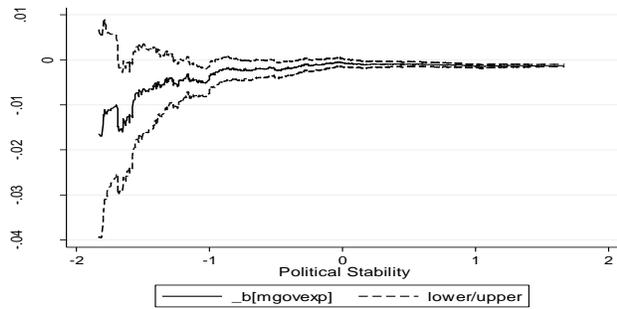
The multiplicative conditioning variable is negative and significant, showing the effect of public size when institutional quality is zero (see Brambor, et al, 2006: p.74). The authors also explain that both the constitutive terms as well as their interaction cannot be considered as standalone effect in multiplicative interaction models. In this sense the results with interaction variables indicate that there might be more complex channels through which public size and institutional quality can influence output growth.

In order to get a clear understanding of the influence of institutional quality variables in affecting the public size–growth relationship, we run rolling regression analysis with a constant window of 120 observations. With this method we arrange our data set in the ascending order of our threshold variables. For instance, if we are interested in the public size thresholds, all the observations are sorted in the order of the lowest to the highest levels of public size. The first regression comprises the lowest public sizes from the pooled data while the second regression drops the lowest public size and includes higher public size, and so on. A constant window size makes the comparison of coefficients easier whereas a window size of 120 observations allows sufficient degree of freedom (see Yilmazkuday, 2011).

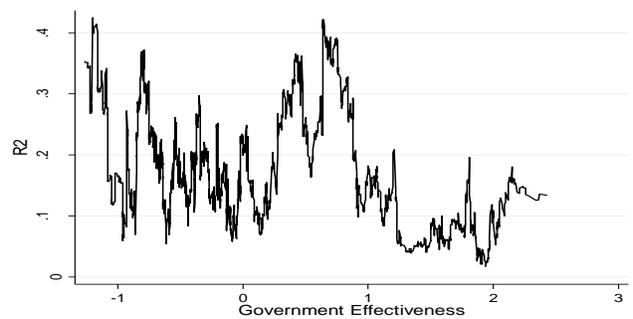
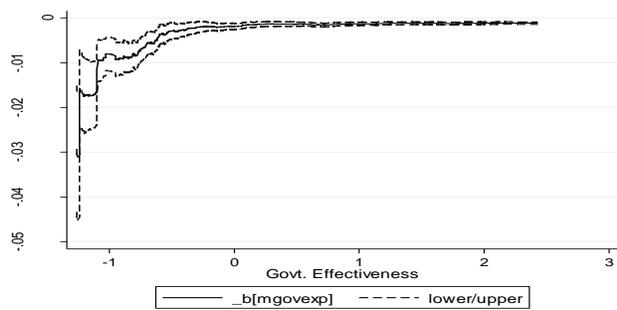
Figure 1 evaluates the nonlinearity in the public expenditures and output growth for the global sample as well as for the two sub-samples, namely, OECD and non-OECD countries. The results are based on specifications 1 and 2 of the Table 2 and are consistent with the first-step findings. The bold lines show the coefficient estimates and the dashed lines 10 percent confidence interval. Public size positively influences growth till around 17% of GDP and adversely affects the latter afterwards. These threshold levels are almost same for both the developed and the emerging economies. In the next step, we investigate the role of institutional variables by using the rolling regression framework. The results are shown in the Figure 2. As can be drawn, the adverse effects of public size are quite strong in countries with poor performance on the indicators like control for corruption, political stability, government effectiveness and regularity quality. Nevertheless, when a country's performance with respect to these institutional developments improves, the negative coefficients approach zero. It is important to mention that although the intensity of adverse effects is very low for more transparent and stable governments, the effects still remains negative. This means the by reducing heavy public size, respective governments need to give space to more productive private investment.



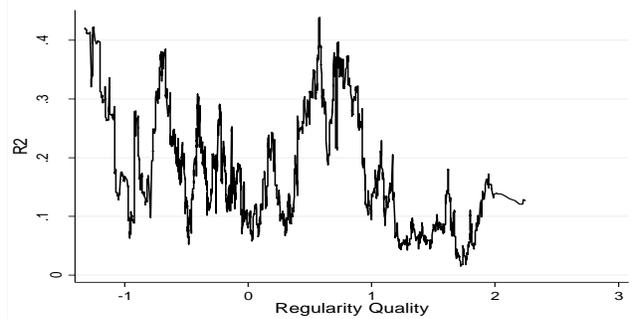
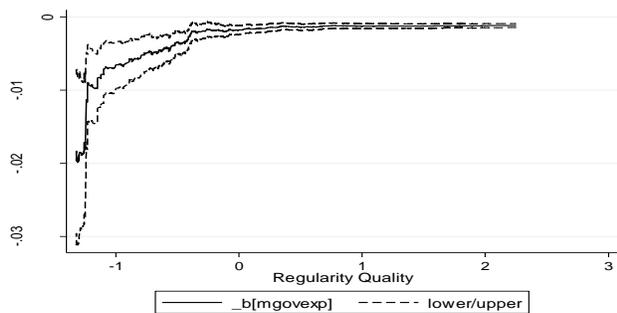
b. Political Stability



c. Government Effectiveness



d. Regularity Quality



5. Conclusion:

This study provides new evidence on the nonlinearity of the relationship between public size and economic growth by using system GMM and rolling regression models to a broad data set for 135 developed and developing countries over the period 1996-2014. The recent theoretical literature indicates that the relationship between public size and growth is nonlinear and that there therefore exists a certain threshold above which public size is harmful and below which it enhances economic growth. However, a precise estimation of the threshold level and the macroeconomic environment that influences this nonlinearity has not been attempted in the previous research.

We have mainly addressed two aspects of public size – growth relationship: the threshold estimates for the whole sample, as well as for developed and emerging economies' sub-samples, and some institutional characteristics that can possibly affect the degree of sensitivity between public size and economic growth. Our first-stage findings confirmed the nonlinear functional form of this relationship, shown by the previous literature (Christie, 2014). While the absence of public sector holds back efficient functioning of markets, an excessively large public size can lead to high levels of distortionary taxes and crowds out private investment. Our threshold estimates are consistent with the previous results of Karras (1997) and Gunalp and Dincer (2010) for a relatively small sample of 20 European and transition economies, respectively. Further, these estimates do not differ significantly for both developed and emerging economies.

With respect to the other country-specific institutional variables that affect the degree of sensitivity in the public size–growth relationship, our results validate the usefulness of these channels in explaining the sensitivity of the relationship between public size and growth. Indeed, the institutional features like political stability, control for corruption, government effectiveness and regularity quality, were found to be the main factors responsible for modifying the sensitivity of the public size–growth relationship in the sample economies. Our evaluation of these factors also highlights the fact that the issues of the welfare consequences of public size and the optimal level of public expenses cannot be settled in a vacuum. Hence the evolution of better institutions can change the magnitude of the adverse effects of public size over time. Lastly, combining the results of optimal public size with the role of institutional characteristics also highlight the fact that although the optimal government size does not differ substantially

among developed and emerging economies, the marginal damage caused by the additional government expenses is substantially high for countries with low quality institutions. This research can be extended by analyzing the role of public debt in this public size and economic growth nexus. Another question will be to see whether the sectoral allocation of these public spending can determine their impact on economic growth.

Bibliography:

- Acemoglu, D., Johnson, S., and Robinson, J. A. (2001). The colonial origins of comparative development: An empirical investigation. *American Economic Review* 91(5): 1369–1401.
- Acemoglu, D., Johnson, S., and Robinson, J.A., (2002a). Reversal of fortune: Geography and institutions in the making of the modern world income distribution. *Quarterly Journal of Economics*, *Forthcoming*.
- Acemoglu, D., Johnson, S., and Robinson, J.A., (2002b). The Rise of Europe: Atlantic Trade, Institutional Change and Economic Growth, *Unpublished*
- Acemoglu, D., Johnson, S., and Robinson, J.A. (2005). Institutions As A Fundamental Cause Of Long-Run Growth. *Handbook of Economic Growth, Volume IA*.
- Acemoglu, D., and Robinson, J.A., (2002). Economic backwardness in political perspective. *NBER Working Paper No.* 8831.
- Armey, R. (1995). The freedom revolution. *Washington, DC*: Rognery Publishing Co.
- Barro, R. (1989). A cross-country study of growth, saving, and government. National Bureau of Economic Research. *Working Paper No.* 2855
- Barro, R. J. (1990). Government Spending in a Simple Model of Endogenous Growth. *The Journal of Political Economy*, 98 (5): 103-125.
- Bergh, A., and Martin, K. (2010). Government Size and Growth: Accounting for Economic Freedom and Globalization. *Public Choice* 142 (1–2): 195–213.
- Besley, T. (2005). Property Rights and Investment Incentives: Theory of evidence from Ghana. *The Journal of Political Economy*, 103(5): 903-937.
- Bose, N., Holman, J. A. and Neanidis, K. C. (2007). The optimal public expenditure financing policy: does the level of economic development matter? *Economic Inquiry*, 45, pp, 433–52.
- Bovenberg, A. Lans, and Bas J. (2005). Redistribution and Education Subsidies Are Siamese Twins. *Journal of Public Economics*, 89(11–12): 2005–2035.
- Chao, J. and Grubel, H. (1998). Optimal Levels of Spending and Taxation in Canada. *The Fraser Institute, Vancouver*.
- Chen, S. T. and Lee, C. C. (2005). Government size and economic growth in Taiwan: a threshold regression approach', *Journal of Policy Modeling*, 27, pp, 1051–66.
- Chobanov, D., and Mladenova, A., (2009). What Is the Optimum Size of Government. *Institute for Market Economics, August, Sophia, Bulgaria*.
- Christie, T. (2012). The effects of government spending on economic growth: testing the non-linear hypothesis. *Bulletin of Economic Research*. 66(2): 183-204.
- Dar, A., and Amir Khalkhali, S. (2002). Government size, factor accumulation, and economic growth: Evidence from OECD countries. *Journal of Policy Modeling*, 24, pp, 679–692.
- Eicher, T. S. and Andreas L. (2009). Institutions and Economic Performance: Endogeneity and Parameter Heterogeneity. *Journal of Money, Credit and Banking* 41(1): 197–219.

- Engen, E., and Skinner, J. (1991). Fiscal policy and economic growth. In *Paper presented at NBER Conference on Taxation*.
- Facchini F., and Melki M. (2011). Optimal Government Size and Economic Growth in France (1871-2008): An Explanation by the State and Market Failures, *CES Working Papers*, ISSN: 1955-611X, Paris, 1-38.
- Friedman F. (1997). If Only the U.S. Were as Free as Hong Kong. *Wall Street Journal*, July 8, A14.
- Grossman, P. J. (1990). Government and growth: Cross-sectional evidence, *Public Choice* 65:217-227.
- Guseh, J. (1997). Government Size and Economic Growth in Developing Countries: A Political-Economy Framework. *Journal of Macroeconomics*, 19(1):175-192
- Hall, R. E. and Charles I. J. (1999). Why Do Some Countries Produce So Much More Output per Worker than Others? *NBER Working Paper No. 6564*.
- Asimakopoulos, S. and Karavias, Y. (2015). The impact of government size on economic growth: a threshold analysis. *Granger Centre Discussion Paper No. 15/02*.
- Kleven, H. J. (2014). How Can Scandinavians Tax So Much? *Journal of Economic Perspectives*. 28(4): 77-98.
- Knack, S. and Keefer, P. (1995). 'Institutions and economic performance: cross-country tests using alternative institutional measures. *Economics and Politics*, 7, pp.207-27.
- Kormendi, R. C. and Meguire, P. (1986). Government debt, government spending, and private sector behavior: Reply. *American Economic Review*, 76, pp. 1180-7.
- Kustepeli, Y., (2005). The Relationship Between Government Size and Economic Growth: Evidence From a Panel Data Analysis, in Dokuz E. University. *Faculty of Business Department of Economics Discussion Paper Series 05/06*.
- Laeven, L. and Beck, T. (2006). Institution Building and Growth in Transition Economies. *CEPR Discussion Paper No. 5718*.
- Landau, D. L. (1983). 'Government expenditure and economic growth: a cross-country study', *Southern Economic Journal*, 49, pp. 783-92.
- Mauro, Paolo (1998) ,Corruption and the composition of government expenditure *Journal of Public economics* 69(2): 263-279.
- North, Douglass C. 1990. Institutions, Institutional Change, and Economic Performance. Cambridge: *Cambridge University Press*.
- North, Douglass C. (1991) Institutions. *Journal of Economic Perspectives*, 5(1): 97-112.
- North, D. C. and Robert P. T. (1973). The Rise of the Western World: A New Economic History. New York: *Cambridge University Press*. pp.8- 171.
- Rahn, R. and Fox, H. (1996). What is the Optimum Size of Government. *Vernon K. Kriebe Foundation*.
- Ram, R. (1986). Government size and economic growth: a new framework and some evidence from cross-section and time-series data', *American Economic Review*, 76, pp. 191-203.
- Rezk, E. (2005). Public Expenditure and Optimal Government Size in an Endogenous Growth Model: An Analysis of the Argentine Case, *National University of La Plata*.
- Rigobon, R., and Rodrik, D. (2000). Rule of Law, Democracy, Openness, And Income: Estimating The Interrelationships. *Journal of Economics of Transition* 13(3): 533-564.
- Rodrik, D. (2000). Institutions For High-Quality Growth: What They Are And How To Acquire Them. *NBER Working Paper No.7540*.

- Rodrik, D. (2002). Institutions Rule: The Primacy of Institutions over Geography and Integration In Economic Development. *NBER Working Paper No.9305*.
- Romero-Ávila, D. and Strauch, R., (2008). Public finances and long-term growth in Europe: Evidence from a panel data analysis, *European Journal of Political Economy* 24(1): 172-191.
- Scully, G. (1994). What is the Optimal Size of Government? National Centre for Policy Analysis, Dallas. *Policy Report, No: 188*.
- Varoudakis, A., Tiongson, E. R. and Pushak, T. (2007). Public finance, governance, and growth in transition economies: empirical evidence from 1992–2004. *Policy Research Working Paper Series No. 4255*, The World Bank.
- Scully, W. (1995). The ‘Growth Tax’ in the United States. *Public Choice*, 85, pp. 71–80.