Revisiting Government Size and Economic Growth:

Does institutional quality matter?

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Abstract

This paper revisits the relationship between government size and economic growth depending on the public sector quality. In this paper, an econometric panel study on a sample of 12 Latin American countries covering 1996-2013 period. It is important to note that the data has its limitation and may affect the quality of the study. The results show no significance in the relationship between government size and economic growth at any level institutional quality. These findings show a negative relationship between government size and economic growth. In addition, the results show a dependency between government size and corruption.

Keywords: Government Size, Economic Growth, Institutional quality.

JEL Classification: E62, H11, O43

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1. INTRODUCTION

As of March 2016, Puerto Rico has a debt of more than $72 billion. The unemployment rate has soared to over 12% and they have immigration numbers that are unbelievable with "1,200 decamping every week in 2014" (The Week , 2016). Bad administration and too many political games have drowned Puerto Rico in an insurmountable debt. The Week writes that "Puerto Rico issued bonds to cover budget shortfalls… those bond sales let the territory's bloated government meet its budgets without laying people off" (The Week , 2016). Over 3 million people left in the island are screaming for help, but Puerto Rico is trapped in a corner because they cannot file for chapter 9 bankruptcy and restructure its debt like Detroit did in 2013. In addition, the federal government is in a tough position because if they bailout Puerto Rico, investors are not going to be happy.

Large government debt and lack of control in the government have lead me to believe that there is a negative relationship between government size and economic growth. In addition, the quality of the institutions has to have an effect on economic growth. Hence, in this paper I will develop a regression where I will find evidence to solidify my argument or to make me reject my hypothesis.

Economic growth has been a topic that has received a lot of attention. Many economists have tried to explain this, with models such as the exogenous model of Robert M. Solow (1956). Further research has been conducted by economists adding possible variables that affect economic growth. Robert J. Barro (1990) adds government spending in a simple endogenous model. Latter, economist Barro (1991) made popular the cross-sectional econometric analysis of growth determinants across countries. Barro found that there is a negative relationship between government size, as real government consumption expenditure to real GDP, and economic growth.

Parting from Barro's premise researchers have added the issue of quality or efficiency in economic growth. For example, Andrew Sunil Rajkumar and Vinaya Swaroop write that "reality is that public spending, governance and development outcomes are interlinked" (Rajkumar & Swaroop, 2007). Diego Romero-Ávila and Daniel Oto-Peralías in 2012 investigated "the relationship between government size and growth, depending on the quality of public sector institutions" (Romero-Ávila & Oto-Peralías, 2012).

This paper conducts an econometric panel study of 12 Latin American countries covering the 1996-2013 periods. It is important to mention that because of lack of data the following years have been taken out of the study: 1997, 1999 and 2001. This study derives from the Romero- Ávila and Oto-Peralías (2012) report which central message "is that government can be an obstacle to economic growth when public sector institutions are weak, but is neutral when bureaucratic quality is high" (Romero-Ávila & Oto-Peralías, 2012).

The rest of this paper is organized as follows: In section 2 I breakdown the literature on the link between government size and growth; Section 3 explains how I use the World Governance Indicators as my measure of institution quality; Section 4 brings in the data and explains the results gathered from the regression; Section 5 I conclude my study and explain possible policy implications.

2. LITERATURE REVIEW

Regarding the issue of the effects of government size effecting economic growth, economists have found different results. For example, Barro (1990, 1991) and Fölster and Henrekson (1998, 2001, 2006) have found that government size has a negative relationship with growth. While Caselli et al. (1996) and Agell et al. (1997, 2006) argue that the relationship is positive or non-significant.

Robert J. Barro (1991) decided to run a cross sectional analysis of 98 countries in the period 1960-1985 where he states that "growth is inversely related to the share of government consumption in GDP" (Barro, 1991). Following these significant results, other economists have added to the debate such as Jonas Agell, Thomas Lindh, and Henry Ohlsson (1996). They investigated how control variables affect the relationship between government size and growth; they found that "the relation is easily tilted from negative to positive by introducing control variables for initial GDP and the dependent population" (Agell, et al., 1996). Subsequently, concluding that theoretical and empirical evidence does not allow any conclusion on whether there is a relationship between government size and economic growth. In an argument against Agell, et al (1996), Stefan Fölster and Magnus Henrekson (1998) conduct a study where they claim to take care of econometric problems that arise from the Agell, et al (1996) paper. Fölster and Henrekson (1998) conclude that there was "a tendency toward a more robust negative growth effect of large public expenditures in rich countries, compared to studies where these econometric problems were ignored or treated more cursorily" (Fölster & Henrekson, 1998).

In 2001, Fölster and Henrekson tried addressing the issue of too many econometric problems again. They conducted a cross section analysis investigating the link between government size and growth. Thus, they ran a panel study on a sample of rich countries covering the 1970-1995 period, where they found "a robust negative relationship between government expenditure and growth in rich countries" (Fölster & Henrekson, 2001). On the other hand, Agell (2006) criticizes Fölster and Henrekson because of failure to address the problem of simultaneity and that reverse causation will lead to bias results. In his study Agell, et al (2006) writes that "cross-country growth regressions are unlikely to come up with reliable information about what policies that best promote

growth" (Agell, et al., 2006). Nevertheless, Fölster and Henrekson (2006) reject the critique by Agell et al (2006), stating that simultaneity was addressed.

It's key to note why I am adding institutional quality. Daron Acemoglu, Simon Johnson, and James Robinson (2005) construct a study to prove that institutions are crucial for economic growth. They argue that institutions "shape the incentives of key economic actors in society… they influence investments in physical and human capital and technology" (Acemoglu, et al., 2005). Deriving from the study, economists add that efficiency and quality of the institutions affect economic growth.

In 1992, Ross Levine and David Renelt point out, "using simple expenditure data without accounting for government efficiency may yield inaccurate measures of the actual delivery of public services" (Levine & Renelt , 1992). Konstantinos Angelopoulos, Apostolis Philippopoulos and Efthymios Tsionas (2008) measure the efficiency of the government and runs a regression on "a sample of 64 countries, both developed and developing, in four 5-year time-periods over 1980-2000" (Angelopoulos, et al., 2008). Their measure of efficiency is "basically the ratio of performance indicators (output) to a measure of public expenditure related to those indicators (input), based on the assumption that the input is used to achieve that output" (Angelopoulos, et al., 2008). In their report they write: "our results imply that what really matters to growth is not the government size per se, but the size-efficiency mix" (Angelopoulos, et al., 2008).

In 2007, Andrew Sunil Rajkumar and Vinaya Swaroop report on "the impact of public spending on outcomes at different levels of governance" (Rajkumar & Swaroop, 2007). Using data from a cross-section of countries covering 1990, 1997 and 2003 they state "that the impact of public spending on outcomes is higher when there is good governance, but this impact could still be well below its true full potential" (Rajkumar & Swaroop, 2007).

Along similar lines, Romero-Ávila & Oto-Peralías (2012) examine the impact of government size on economic growth based on the quality of the institutions. They measure the quality of institutions as bureaucracy quality. When concluding their analysis they state that their results contribute on the debate over government size being a hindrance to growth. In their analysis they found existence of high heterogeneity in the relationship between government size and growth given to the level of public sector quality.

3. INSTITUTIONAL QUALITY

In 1999, Kaufmann, Kraay and Pablo Zoido-Lobatón run a cross section analysis of over 150 countries trying to "provide new empirical evidence of a strong causal relationship from better governance to better development outcomes" (Kaufmann, et al., 1999). They introduce the World Governance Indicators (WGI) "a new database of governance indicators compiled from different existing sources" (Kaufmann, et al., 1999). In this report they conclude that "governance, as measured by the indicators, matters a great deal for economic outcomes" (Kaufmann, et al., 1999).

This is why to determine the institutional quality of the countries, I decided to use the WGI. Daniel Kaufmann, Aart Kraay and Massimo Mastruzzi (2010) "estimate a new set of parameters for each year, and all of the parameter estimates for each data source in each year, together with the resulting weights, are reported online in the Documentation tab of www.govindicators.org" (Kaufmann, et al., 2010). This reports "the aggregate WGI measures in two ways: in the standard normal units of the governance indicator, ranging from around -2.5 to 2.5, and in percentile rank terms ranging from 0 (lowest) to 100 (highest) among all countries worldwide" (Kaufmann, et al., 2010). For the purpose of my study I will be using the standard normal units.

The World Governance Indicators calculates six dimensions of governance in a country. Nevertheless, I will be using only four of such. Them being government effectiveness, regulatory

quality, control of corruption, and rule of law. However, of the six dimensions I found more fitting only two of these dimensions. Them being government effectiveness and control of corruption, a definition of all is presented below.

- *Government effectiveness* captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
- *Control of corruption* captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests

4. MODEL

a. $Growth_i = \beta_0 + \beta_1 govsize + \beta_2 income + \beta_3 corrupt + \beta_4 govsize*corrupt + U_i$

b. $Growth_i = \beta_0 + \beta_1 govsize + \beta_2 income + \beta_3 goveff + \beta_4 govsize*goveff + U_i$

For reasons of multicolinearity I decided to make two separate models one constructed with *corrupt*, as control of corruption from WGI, and a second one with *goveff*, being government effectiveness from WGI. Further, I add two interaction terms in order to verify if government size and corruption are dependent of each other, also, government size and government effectiveness. For the rest of the variables shown above, our dependent variable is *growth,* being annual percentage growth of GDP per capita, as our dependent variable. Our independent variables consist of *govsize*, being final general government expenditure, *income*, being logarithm of per capita GDP,

For my *income* variable I have lagged the data by one year to see the actual effect of government size. Important to note that in this model I do not use *invest,* as capital formation %

of GDP, as an independent variable. The reason for not using it is of a endogeneity issue, once I ran my correlogram I noticed that *invest* and *govsize* are highly correlated, thus I dropped *invest.* In addition, I run to separate models because *corrupt* and *goveff* are highly correlated. Figure 1, shows a correlogram of my independent variables.

[*Insert Correlogram 1 about here*]

5. DATA

I run a panel data analysis to find the empirical results that will help me conclude my thesis. In the results I present three different regression: an OLS model, a panel with fixed effects and a panel regression with random effect. The addition of fixed effects accounts for the uniqueness of each country, hence it allow as variables that don't change overtime to be correlated with the model. On the other hand, the random effects model adds unobserved random effects by country. Nonetheless, in both models one doesn't measure heterogeneity, but one accounts for it. Table1 presents the results for the first model with *corrupt* as one of our variables.

[*Insert Table 1 about here*]

Column 1 of the table has the OLS estimator, this is added for purposes of running a linear regression of the data, however, I am focused on column 2 and 3. In addition, after running a Hausman test on the two models I conclude that the best fitting model is the fixed effects model or column 2.

[*Insert Hausman Test 1 about here*]

Column 2 shows that income has a positive effect on *growth* with a coefficient of 1.025, significant at a 95% confidence level. These means that for every percentage increase in real per capita GDP of the earlier year lead an annual percentage growth per capita increase of 1.025%, holding all other things constant. As for government size it shows a negative relationship with a

coefficient of -73.07, being significant at a 99% confidence level. Thus, for every percentage increase in government expenditure as part of GDP there is a decrease in annual percentage growth by 73.07%, holding all other things constant. Next variable shown in the regression is *corrupt*, however, this coefficient turned out to be insignificant. On the other hand, the interaction term was significant at a 90% confidence level. The coefficient being 24.51, this leads me to state that there is a positive dependency between corruption and government size.

The second model which included government effectiveness as one of the models is represented in Table 2. This table is also structured in the same fashion with the OLS model in column 1, fixed effect in column 2 and random effects in column 3.

[*Insert Table 2 about here*]

I also performed a Hausman test for this model and it concludes that the best fitting model is the fixed effects model or column 2.

[*Insert Hausman Test 2 about here*]

Column 2 represents an even bigger positive relationship between *growth.* The results show a coefficient of 1.351, significant at a 99% confidence level. These means that for every percentage increase in real per capita GDP of the earlier year lead an annual percentage growth per capita increase of 1.351%, holding all other things constant. Second, government continues to show a negative relationship with growth with a coefficient of -76.35 being significant at a 99% confidence level. Hence, for every percentage increase in government expenditure as part of GDP there is a decrease in annual percentage growth by 76.35%, holding all other things constant. The other two variables of government effectiveness and the interaction term come up with a positive relationship, conversely, they are statistically insignificant.

6. CONCLUSION

So, is there a relationship between government size and economic growth? According to the results shown the answer is a clear yes. Many economists may argue otherwise because government creates jobs and set the infrastructure for the growth of a country. Conversely, I believe there is a threshold where too much government expenditures affect the economy and the results have evidence of such.

I would, however, say that the data used can suffer of lack of observations, In addition, the model and regressions are conducted by an amateur economist, subsequently, the model may suffer from mistakes. Nevertheless, the results have helped me confirm my thesis. Consequently, I would like to add that reports like this one should be conducted and brought to governments like Puerto Rico. Puerto Rico is going through a crisis very much like Greece is and the world has not paid much attention to it. Economists and the US government need to take action on this matter. As for Puerto Rico, they should definitely decrease their government spending.

Also, in this report the results showed a dependency between government size and corruption. Hopefully, these result help shed light in the argument that corruption is never good for a country. The dependency states that a government size increase represents more corruption, in unison, as more corrupt the government becomes the bigger the government size gets and that is very observable in the past decade in Puerto Rico. Finally, future research could enhance the model and enrich the data, plus, convey more information on the relationship between government size and economic growth.

REFERENCES

Acemoglu, D., Johnson, S. & Robinson , J., 2005. *INSTITUTIONS AS A FUNDAMENTAL CAUSE OF LONG-RUN,* s.l.: Elsevier B.V.

Agell, J., Lindh, T. & Ohlsson, H., 1996. *Growth and the public sector: A critical review,* Uppsala: Uppsala UniĺersitY.

Agell, J., Ohlsson, H. & Thoursie, P. S., 2006 . *Growth effects of government expenditure and taxation in rich countries: A comment,* Uppsala: European Economic Review.

Angelopoulos, K., Philippopoulos, A. & Tsionas, E., 2008. *Does public sector efficiency matter? Revisiting the relation between fiscal size,* Athens: University of Glasgow.

Barro, R. J., 1990. *Government Spending in a Simple Model of Endogenous Growth ,* Chicago: The University of Chicago Press.

Barro, R. J., 1991. *Economic Growth in a Cross Section of Countries,* Boston: The MIT Press.

Caselli , F., Esquivel, G. & Lefort, F., 1996. *Reopening the Convergence Debate:A New Look at Cross-Country Growth,* Cambrige : Journal of Economic Growth .

Fölster, S. & Henrekson, M., 1998. *Growth and the public sector: a critique of the critics,* Stockholm: European Journal of Political Economy.

Fölster, S. & Henrekson, M., 2001. *Growth effects of government expenditure and taxation in rich countries,* Stockholm: Elsevier Science B.V..

Fölster, S. & Henrekson, M., 2006. *Growth Effects of Government Expenditure and Taxation in Rich Countries: A Reply,* Stockholm: Stockholm School of Economics.

Kaufmann, D., Kraay, A. & Mastruzzi, M., 2010. *The World Governance Indicators,* s.l.: The World Bank.

Kaufmann, D., Kraay, A. & Zoido-Lobatón, P., 1999. *Governnace Matters,* Washington DC: The World Bank.

Levine, R. & Renelt , D., 1992. *A Sensitivity Analysis of Cross-Country Growth Regressions,* s.l.: American Economic Association.

Rajkumar, A. S. & Swaroop, V., 2007. *Public spending and outcomes: Does governance matter?,* Washinhton D.C.: Journal of Development Economics.

Romero-Ávila, D. & Oto-Peralías, D., 2012. *Tracing the Link between Government Size and Growth: The Role of Public,* Sevilla, Spain: Pablo Olavide University.

Solow, R. M., 1956. *A Contribution to the Theory of Economic Growth,* Boston: The MIT Press.

The Week , 2016. *The Puerto Rico crisis, explained.* [Online]
Available at: http://theweek.com/articles/614667/puerto-rico-crisis-explained
[Accessed 28 March 2016].

APPENDIX I. Description of variables

Variable	Definition	Source
Corrupt	World Governance Indicators for control corruption	World Governance Indicators (WGI), 2016 (World Bank)
Growth	GDP annual percentage growth	World Development Indicators (WDI), 2016 (World Bank)
Government Effectiveness	World Governance Indicators for Government Effectiveness	WDI 2016 (World Bank)
Government Size	General Government final consumption expenditure (% of GDP)	WDI 2016 (World Bank)
Income	GDP per Capita	WDI 2016 (World Bank)
Investment	Capital Formation	WDI 2016 (World Bank)
Regulatory Quality	World Governance Indicators for Regulatory Quality	WGI 2016 (World Bank)
Rule of Law	World Governance Indicators for Rule of Law	WGI 2016 (World Bank)

TABLES

Correlogram

	growthpc	invest	income	govsize	corrupt	goveff
growthpc	1.0000					
invest	0.1776	1.0000				
income	0.1448	-0.1745	1.0000			
govsize	0.5064	0.0827	0.0867	1.0000		
corrupt	0.2175	-0.1201	0.6606	0.1921	1.0000	
goveff	0.2152	-0.0649	0.7500	0.1884	0.9020	1.0000

Table 1

	(1) growthpc	(2) growthpc	(3) growthpc
income	0.376	1.025**	0.339
	(0.345)	(0.478)	(0.385)
govsize	25.13***	-73.07***	21.88***
	(3.443)	(20.08)	(5.017)
corrupt	-0.595	1.658	-0.347
	(0.732)	(1.193)	(0.851)
intcorr	8.747	24.51*	8.959
	(6.019)	(14.06)	(7.604)
_cons	-3.323	-1.796	-2.765
	(3.027)	(3.831)	(3.349)
N	180	180	180
adj. R^2	0.264	0.091	

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < .01$

Fixed Effects 1

```
Fixed-effects (within) regression               Number of obs      =       180
Group variable: id                              Number of groups   =        12

R-sq:  within  = 0.1675                         Obs per group: min =        15
       between = 0.3335                                        avg =      15.0
       overall = 0.0817                                        max =        15

                                                F(4,164)           =      8.25
corr(u_i, Xb)  = -0.9622                        Prob > F           =    0.0000

------------------------------------------------------------------------------
    growthpc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      income |    1.025413   .4776872     2.15   0.033     .0822029    1.968623
     govsize |   -73.06835   20.08431    -3.64   0.000    -112.7255   -33.41118
     corrupt |     1.65827    1.19269     1.39   0.166    -.6967386    4.013279
     intcorr |    24.51486   14.05908     1.74   0.083    -3.245278      52.275
       _cons |   -1.795506   3.831429    -0.47   0.640    -9.360796    5.769784
-------------+----------------------------------------------------------------
     sigma_u |   6.7295108
     sigma_e |    2.157426
         rho |   .90679991   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(11, 164) =     5.25                 Prob > F = 0.0000
(est2 stored)
```

Hausman Test 1

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |    fixed         est3       Difference          S.E.
-------------+----------------------------------------------------------------
      income |   1.025413     .3394031        .6860097        .2821922
     govsize |  -73.06835     21.87575       -94.9441        19.44772
     corrupt |    1.65827    -.3474821        2.005752        .8359068
     intcorr |   24.51486     8.959258         15.5556        11.82537
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       36.84
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

Table 2

	(1) growthpc	(2) growthpc	(3) growthpc
income	0.377	1.351***	0.364
	(0.386)	(0.498)	(0.400)
govsize	24.44***	-76.35***	22.07***
	(3.229)	(20.61)	(4.452)
goveff	-0.587	1.972	-0.380
	(0.760)	(1.393)	(0.836)
inteff	10.31	2.305	9.590
	(6.264)	(19.42)	(7.794)
_cons	-3.274	-4.376	-2.984
	(3.336)	(3.943)	(3.443)
N	180	180	180
adj. R^2	0.266	0.036	

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < .01$

Fixed Effects 2

```
Fixed-effects (within) regression               Number of obs      =       180
Group variable: id                              Number of groups   =        12

R-sq:  within  = 0.1165                         Obs per group: min =        15
       between = 0.5198                                        avg =      15.0
       overall = 0.1473                                        max =        15

                                                F(4,164)           =      5.41
corr(u_i, Xb)  = -0.9683                        Prob > F           =    0.0004

------------------------------------------------------------------------------
    growthpc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      income |    1.350567   .4976748     2.71   0.007     .3678905    2.333243
     govsize |   -76.35402   20.60537    -3.71   0.000      -117.04   -35.66801
      goveff |    1.972089   1.392759     1.42   0.159    -.7779623    4.722141
      inteff |    2.305046   19.42282     0.12   0.906    -36.04598    40.65607
       _cons |   -4.376149   3.942812    -1.11   0.269    -12.16137     3.40907
-------------+----------------------------------------------------------------
     sigma_u |  6.3378057
     sigma_e |  2.2225312
         rho |  .89049153   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(11, 164) =     4.04             Prob > F = 0.0000
```

Hausman Test 2

	Coefficients (b) fixed	(B) est3	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
income	1.350567	.3636448	.9869218	.2957396
govsize	-76.35402	22.06856	-98.42258	20.11857
goveff	1.972089	-.3799732	2.352063	1.114002
inteff	2.305046	9.589918	-7.284871	17.79058

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 28.17
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)