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The Impact of Government Debt on Economic Growth: An Overview for Latin America*

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Abstract

This paper investigates the impact of government debt on GDP in 16 Latin American economies, namely Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela over a period of about fifty years (1960-2015). The short-run impact of debt on GDP growth is positive, but decreases to close to zero beyond public debt-to-GDP ratios between 64 and 71% (i.e. up to this threshold, additional debt has a stimulating impact on growth). The institutional variable selected shows the expected sign suggesting that countries with democratic governments exhibit higher growth rates.

Keywords: Debt, growth
JEL Classification: H63, O40

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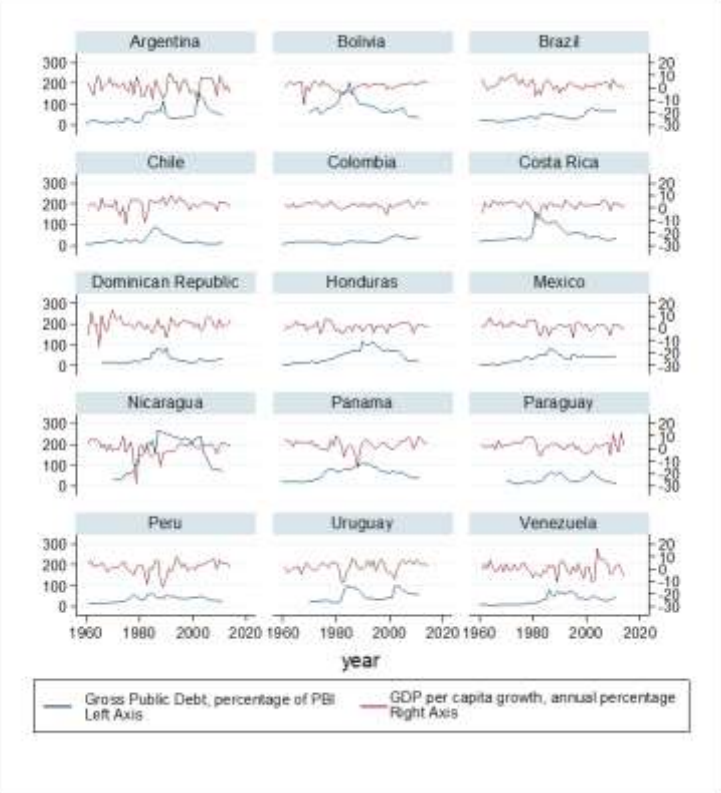
1. Introduction

The conditions under which public debt is growth-enhancing have been studied by economists for a long time, but it has recently undergone a notable revival probably fuelled by the substantial weakening of public finances in different economies as a result of the financial crisis of 2008 (Gómez-Puig and Sosvilla-Rivero, 2015). Notwithstanding this revival, the results from the empirical literature on the relationship between public debt and economic growth are far from conclusive (Panizza and Presbitero, 2013).

As to Latin America, the different political points of view related to the debt burden and some sovereign past debt crisis have stimulated an intense debate both on the effectiveness of fiscal policies and on the possible adverse consequences of the accumulation of public debt for the countries. As known, in most of these economies, the public debt almost doubled it volume from the 1970s onwards, but without a clear effect on GDP (see Chart 1). However, to our knowledge, no effort has yet been made for analyzing the effect of debt accumulation on economic growth taking into account Latin America solely.

Chart 1



In this study, we focused on the on the relationship between GDP and public debt during 1960-2015 in a group of 15 Latin American countries namely Argentina, Bolivia,

Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Compared to the existing literature, this allows us to focus on a less heterogeneous sample. Similar to other relevant studies, we consider the same Gross Public Debt measure in order to permit comparisons of the results. As we do the analysis for an extended period, the Great Recession impact on the economies is considered. Another novelty is that we separate ourselves from other related studies since we introduce an institutional variable to test the impact of democratic governments on growth.

The rest of the paper is organized as follows. In section 2 we provide a quick and short review of the empirical literature on the effect of debt on GDP growth. In section 3 we estimate a simple model of a direct relationship between debt and growth. Section 4 concludes.

2. Brief Empirical Literature Review

We find that the empirical literature on the effect of debt on economic growth is relatively scarce, but that has gained significance. Despite its scarcity, two important issues must be highlighted. The first one is that the literature focuses on the direct effect of debt on growth, but it fails to account for the channels of this effect.[2] The second one is that the results of the related literature on this relationship between public debt and GDP are far from being convincing as we shall briefly summarize.[3]

As to the empirical studies, Schclarek (2014) uses a sample of 24 industrial countries with averaged data over seven five-year periods between 1970 and does not find any significant relationship between public debt and economic growth in industrial countries. However, Reinhart and Rogoff (2010) find that the relationship between public debt and growth can be represented by an inverted U-shaped pattern (i.e. whilst low levels of public debt positively affect economic growth, high levels have a negative impact). They use a database of 44 countries over 200 years and suggest that the relationship is weak for public debt ratios below 90% of GDP, but growth rates decrease substantially above this threshold.

Following these studies, Lof and Malinen (2014) find no evidence for a robust effect of debt on growth, even for higher levels of debt; whereas Woo and Kumar (2015), controlling for other factors that also influence growth, detected an inverse relationship between the two variables.

As to Europe, Checherita-Westphal and Rother (2012) find that the turning point (beyond which government debt negatively affects growth) is at 90–100% of GDP. Likewise, Baum et al. (2013) detect a similar threshold by employing a dynamic approach (the short-run impact of debt on per capita GDP growth is positive but it decreases to zero beyond ratios of 67%, and for ratios above 95% additional debt has a

[2] See Calderón and Fuentes (2013).
[3] See Jacobo and Jalile (2017a) for further details.

negative impact). In contrast, Dreger and Reimers (2013) base their analysis on the distinction between sustainable and non-sustainable debt periods and find that the negative impact of the debt-to-GDP ratio on growth in the euro area is limited to periods of non-sustainable public debt. These studies are unified and extended by Antonakakis (2014), who via a panel approach (in addition to debt non-linearities) also examines the effect of debt sustainability on economic growth.

Eberhardt and Presbitero (2015) investigate the debt-to-GDP ratio in 118 developing countries, emerging and advanced economies and they find some evidence for non-linearity. These authors argue that there is no evidence for a common debt threshold for all countries over time. Moreover, Égert (2015) presents some empirical evidence suggesting that 90% is not a magic number because the threshold may be lower and the nonlinearity may change across different samples and specifications. Finally, examining the causal bi-directional direction between debt and growth in a sample of eleven European countries, Gómez-Puig and Sosvilla-Rivero (2015) find that public debt has a negative effect on growth from an endogenously determined breakpoint and above a debt threshold varying between 56% and 103% according to the country.

To sum up, we seemed to understand that there is no consensus related to the impact of public debt on the product. At this point, we adopt the conventional point of view that in the short-run product is determined by demand and thus the government debt can effectively have a positive effect on disposable income, aggregate demand and, in general, on output (Elmendorf and Mankiw, 1999). However, a larger public debt may displace (crowds out) private investment and may harm growth in the long run by raising long-term interest rates (Baldacci and Kumar, 2010).

3. Estimation and Results

For our estimation, we follow Baum et al. (2012) and Checherita-Westphal et al. (2012) focusing on the short-term effect of public debt on economic growth.

Specifically, we analyze the impact of one-year lagged debt-to-GDP ratios on annual real GDP per capita growth rates. As a consequence, we obtain a near contemporaneous effect, which gives us an idea of the short-term debt impact. Hence, a positive impact of debt on growth could be interpreted as a stimulating effect of additional debt. However, the possibility that long-term effects of high debt might be negative cannot be ruled out based on the yearly analysis.

The data comes from the World Development Indicators and the International Financial Statistics databases covering the period 1960-2015.

Following the existing literature, our empirical growth model is based on a conditional convergence equation that relates the GDP per capita growth rate to the initial level of income per capita, the investment/saving-to-GDP rate and the population growth rate.

The model is augmented to include the level of gross government debt (as a share of GDP).

We are interested in checking whether there exists a non-linear impact of government debt on growth, so, we use a quadratic equation in debt. Other control variables include: (i) indicators for the openness of the economy (such as the sum of export and import shares in GDP) to expand the model beyond a closed-economy form; (ii) following Loayza, Fajnzylber, and Calderon (2005), a set of structural and governance factors such as human capital and the existence of democratic governments that could enhance growth; and (iii) policy environment variables.

In our model, human capital enters as a reproducible factor in the production function that augments growth. It also enhances the ability of nations to create (or to adapt) to new technologies (Acemoglu and Zilibotti, 2001). This variable is approximated by the initial gross rate of secondary schooling.

As to the democratic government, the variable includes several institutional aspects that may hurt growth, affecting the efficiency of investment (North, 1990). Specifically, we test the impact of the presence of democratic governments on growth. We turn to the common claim that the lack of democracy becomes a particularly powerful constraint on economic growth for countries with low levels of development (e.g., Aghion, Alesina and Trebbi, 2008). There is no fully satisfactory measure of regime type (Munck and Verkuilen 2002), and the options are considerably reduced when one requires a measure that provides a large sample of countries over a long period of historical time. The only measure with broad historical coverage is the "Polity2" variable, drawn from the Polity IV dataset (Marshall and Jaggers 2000). This variable measures the extent to which democratic or authoritarian government ("authority patterns") are institutionalized in a given country. It takes into account how the executive is selected, the degree of checks on executive power, and the form of political competition.

The last group of variables (iii) involves price stability, measured as inflation rate, and distortionary taxation and fiscal discipline, that could be approximated by overall government balance-to-GDP ratio.[4]

The basic equation is as follows:

$$g_{i,t} = \alpha + \beta_1 debt_{i,t-1} + \beta_2 debt^2{}_{i,t-1} + \varphi pbipc_{i,t-1} + \gamma gfk_{i,t-1} + \delta pop_{i,t-1} + \kappa(other\_controls) + \\ + \mu_i + \upsilon_t + \varepsilon_{i,t}$$

where g_{it} is the growth rate of GDP per capita; $pbipc_{it}$ is the initial level of GDP per capita; $debt_{it}$ is gross government debt as a share of GDP; gfk_{it} is investment rate

[4] Given the need to control for country specific characteristics, the equation also contains country-fixed effects. The country dummies capture economic and social characteristics for each country that remain broadly unchanged over time. In addition, year dummies are included to control for common shocks across countries. A list of the variable used in the various regression models could be requested to the authors or seen in Jacobo and Jalile (2017a).

proxied as gross fixed capital formation) as a share to GDP; pop_{it} is population growth rate; μ_i is country fixed effects; v_t is time fixed effects; and ε_{it} is the error term.[5]

The basic estimation technique is panel fixed-effects corrected for heteroskedasticity and autocorrelation. The results across various models are presented in Table 1. Given the strong potential for endogeneity of the debt variable, especially reverse causation (low or negative growth rates of per-capita GDP are likely to induce higher debt burdens), we use various instrumental variable estimation techniques (the results are also presented in Table 1).

Table 1

Variables	Fixed Effects Models		Instrumental variables Models	
	Model (1)	Model (2)	Model (1_IV)	Model (2_IV)
ln(gdp_pc)	*-3.986****	*-3.708****	*-5.884****	*-5.148****
	(1.39)	(1.405)	(1.747)	(1.771)
debt	*0.0516****	*0.0512****	*0.115****	*0.116****
	(0.0126)	(0.0126)	(0.0351)	(0.0348)
debt_sq	*-0.000402****	*-0.000404****	*-0.000811****	*-0.000828****
	(0.000073)	(0.000073)	(0.000196)	(0.000196)
openess	*-0.00353*	*-0.00432*	*-0.0103*	*-0.0120*
	(0.0133)	(0.0133)	(0.0147)	(0.0146)
gfkf	*-0.198****	*-0.199****	*-0.262****	*-0.259****
	(0.0468)	(0.0468)	(0.0544)	(0.0541)
popgrowth	*0.204*	*0.126*	*-0.927*	*-1.175*
	(0.664)	(0.666)	(0.842)	(0.850)
cpi_inflation	*-0.0295*	*-0.0246*	*-0.0469***	*-0.0368**
	(0.0183)	(0.0186)	(0.0214)	(0.0215)
polity2		*0.0520*		*0.102***
		(0.0399)		(0.0451)
cons	*44.64****	*41.53****	*64.37****	*56.59****
	(12.75)	(12.96)	(15.89)	(16.20)
Observations	*503*	*503*	*463*	*463*
Countries	*15*	*15*	*15*	*15*
Debt TP	*64.179*	*63.366*	*70.900*	*70.048*
Country FE	*Yes*	*Yes*	*Yes*	*Yes*
Year FE	*Yes*	*Yes*	*Yes*	*Yes*
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

As stated in Hiebert et al. (2002), in a panel context many studies on growth regressions have made use of the instrumental variable (IV) approach to deal with the issue of simultaneity bias. The estimators used in our paper are either 2-SLS (two-stage least squares) or GMM estimators. With the GMM estimator we also correct for the possible heteroskedasticity and autocorrelation in the error structure by using the consistent estimator. The two-step GMM provides some efficiency gains over the traditional IV/2-SLS estimator derived from the use of the optimal weighting matrix, the overidentifying restrictions of the model, and the relaxation of the independent and identical distribution (i.i.d.) assumption (see Baum et al., 2007).

[5] For "*other controls*" see description in the text above.

We instrument the debt variable for each country through either its time lags (up to the 5th lag) or the average of the debt levels of the other countries in the sample. Both instruments are highly correlated with the instrumented variable, as shown by the first stage statistics such as Shea partial R-square. While using lagged terms of regressors as instruments is relatively common practice with macroeconomic data, for the debt-to-GDP ratio, this may be more problematic given the high persistence of the debt stock variable. Thus, we also estimate for every country and year in the sample the average public debt-to-GDP ratio of the other countries and use this variable as an instrument. This instrument has the advantage of not having a direct causal effect on the growth rate, at least if one assumes that there is no strong relationship between debt levels in other countries considered and the per-capita GDP growth rate in one specific country. The endogeneity problem is also mitigated in our specification by the fact that the explanatory variables are all lagged by 1 year relative to the dependent variable.

We have also estimated the confidence intervals for each model turning point. Since the turning point is a non-linear combination (the ratio) of two estimated coefficients (debt and debt squared) the normal distribution 95% confidence intervals (CI) estimated for each coefficient cannot be used to compute the CI for the turning point. We thus use the delta method to assess the statistical uncertainty surrounding the turning point estimates.

The delta method is commonly applied to compute the standard error of non-linear functions for which it is too complex to analytically compute the variance (Vance, 2006). The delta method basically expands a function of random variables (e.g., the ratio) about its mean using (usually a one-step) Taylor approximation, and then computes the variance. Its accuracy depends on the degree of linearity of the derivative function at the evaluation point (Vance, 2006), i.e., it is a good Taylor approximation when the random variable has a high probability of being close enough to its mean. Therefore, the delta method assumes that the coefficients in the model are normally distributed, being influenced by the sample size (Hole, 2007).

Thus, the results across all models show a highly statistically significant non-linear relationship between the government debt ratio and the per-capita GDP growth rate for Latin American countries in our sample. The debt-to-GDP turning point of this concave relationship (inverted U-shape) is roughly between 64 and 71% on average for the sample, across all models.

Finally, the institutional variable is also statistically significant and it tends to highlight importance of democratic governments on economic growth rates.

4. Final Comments

We find that the coefficients are statistically significant and in the same direction of the ones existing in the literature. In fact, we find a highly statistically significant non-linear relationship between the government debt ratio and the per-capita GDP growth rate for

Latin American countries in our sample. The debt-to-GDP turning point of this concave relationship (inverted U-shape) is roughly between 64 and 71% on average for the sample, across all models. This means that, on average for the Latin American countries, government debt to-GDP ratios above this threshold would have a negative effect on economic growth (i.e. up to this threshold, additional debt has a stimulating impact on growth). The institutional variable selected shows the expected sign and countries with democratic governments tend to exhibit higher growth rates.

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