



## Growth and productivity: The role of government debt<sup>☆</sup>

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### ABSTRACT

We use a panel of 155 countries to assess the links between growth, productivity and government debt. Via growth equations we assess simultaneity, endogeneity, cross-section dependence, nonlinearities, and threshold effects. We find a negative effect of the debt ratio. For the OECD, the higher the debt maturity the higher the economic growth; financial crisis is detrimental for growth; fiscal consolidation promotes growth; and higher debt ratios are beneficial to TFP growth. The growth impact of a 10% increase in the debt ratio is  $-0.2\%$  ( $0.1\%$ ) respectively for countries with debt ratios above (below) 90% (30%), and an endogenous debt ratio threshold of 59% can be derived.

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## 1. Introduction

The relevance of government debt for economic growth has become crucial, particularly in a context where policy makers have to face increasing fiscal imbalances. In terms of economic theory, at moderate levels of government debt, fiscal policy may induce growth, with a typical Keynesian behaviour. However, at high debt levels, the expected future tax increases will reduce the possible positive effects of government debt, decreasing investment and consumption resulting in less employment and lower output growth. Unfortunately, the empirical evidence that is currently available to shed light on the importance of government debt (and related aspects) for growth of productivity is not very conclusive. This paper attempts to fill some gaps and intends to provide some additional empirical evidence of the effects of government debt (and its maturity structure) on output growth and productivity for advanced countries (OECD) as well as emerging and developing countries.

We have recently observed a revival in this theme fuelled by the substantial worsening of public finances in many advanced (and other) economies as a result of the 2008/09 financial and economic crisis (one recent contribution is due to Reinhart and Rogoff,

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2010).<sup>1</sup> In response, governments around the world implemented important fiscal stimulus. More than ever it is important to understand the effects of government debt on growth, capital accumulation and productivity, particularly when associated with financial crisis.<sup>2</sup>

The linkages between fiscal policy and growth have been the object of several analyses. For instance, Gemmell (2004) has summarised many existing empirical works dividing it into three generation studies depending on the econometric methods used. Even though our main purpose is empirical in nature, it is worth referring to some initial theoretical contributions which serve as the underlying basis for our analysis. In particular, Modigliani (1961) and Diamond (1965) first, and later Saint-Paul (1992), take a theoretical approach based on a neoclassical growth model and suggest that an increase in public debt will always decrease the growth rate of the economy. Regarding the developments of government debt, Corsetti, Kuester, Meier, and Müller (2010) discuss the importance of the reversal of significant fiscal imbalances, to ensure the curbing of government debt, notably in a context where monetary policy is limited by a zero lower bound regarding policy interest rates.

With respect to the empirical evidence, most papers have focussed on advanced countries. Authors looking at mixed samples such as Schclarek (2004) focusing on a panel of 59 developing and 24 advanced countries for the period 1970–2002 conclude that, for developing countries, there is always a negative and significant relation between debt and growth. For advanced countries, he does not find any robust evidence, suggesting that higher public debt levels are not necessarily associated with lower GDP growth rates. Checherita and Rother (2010) look at the Euro-area from 1970 to 2010 and find a nonlinear impact of debt on growth with a turning point at about 90–100% of GDP. On the same line, Kumar and Woo (2010) used 38 advanced and emerging countries from 1970 to 2007 and also find an inverse relationship between initial debt and subsequent growth, controlling for other determinants of growth.

On the other hand, de la Fuente (1997) using OECD countries between 1965 and 1995 reports evidence of a sizeable negative externality effect of government on the level of productivity. In addition, Dar and Amirkhalkhali (2002) for a sample of 19 OECD countries find that Total Factor Productivity (TFP) growth and productivity of capital are weaker in countries with larger government (which can be proxied by the debt-to-GDP ratio).

In this study we use cross-sectional/time series data for a panel of 155 developed and developing countries for the period 1970–2008. We do not present or test a comprehensive theory of economic growth. Rather, we are investigating the stability of coefficients over time and across countries (and groups of homogeneous economies). In the empirical estimation, the paper makes use of growth equations and growth accounting techniques (to explore different channels of impact) and focus on a number of econometric issues that can have an important bearing on the results. In particular, we assess such issues as simultaneity, endogeneity, the relevance of nonlinearities, and the importance of outliers.

Therefore, this paper contributes to the literature by assessing the debt–growth nexus with a diversified variety of methods, providing sensitivity and robustness, and, in more specific terms, by addressing the following issues: i) The impact of government debt and its maturity on growth, the existence of nonlinearities and the relevance of debt thresholds. ii) The relevance of financial development (e.g., banking sector development, stock market development, for which we build several financial development proxies) and the impact of financial crises (debt, currency and banking) on the debt–growth relationship. iii) On a growth accounting perspective, the impact on TFP growth (for that purpose we build a measure of TFP), capital stock accumulation, private and public investment. iv) Differences between country groups (OECD vs. Emerging and Developing).

Our main results can be summarised as follows: i) there is a negative effect of the government debt ratio for the full sample; ii) a quadratic debt term is not statistically significant; iii) for the OECD, the longer the average debt maturity the higher the economic growth; iv) financial crisis is detrimental for growth, notably with high debt ratios; v) fiscal consolidation promotes growth in a non-Keynesian fashion; vi) for countries with debt ratios above (below) 90% (30%) the growth impact of a 10% increase in the debt ratio is  $-0.2\%$  (0.1%); vii) an endogenous debt ratio threshold of 59% can be derived for the full sample; viii) financial development, stock market development, financial efficiency and bond market development positively affect growth in the OECD; ix) higher debt ratios are beneficial to TFP growth, the growth of capital stock per worker, and detrimental to the levels of private and public investment; x) the higher the household's debt burden coupled with higher government debt, the lower the output growth; xi) most results are confirmed even after we address cross-sectional dependence.

The paper is organised as follows. Section 2 describes the analytical and econometric methodology. Section 3 presents the data, in particular the construction of the TFP and financial development measures. Section 4 discusses our main results. Section 5 concludes.

## 2. Methodology

### 2.1. Analytical framework

A neoclassical growth model provides the analytical framework for our analysis, and the underlying basic aggregate production function can be written as  $Y = F(L, K)$ , with  $Y$  being the real aggregated output;  $L$ , labour force or population;  $K$ , capital

<sup>1</sup> Also in most countries, large budget deficits have coincided in the past with less efficiency government spending, large bureaucracies and other counterproductive economic policies. Hence, amongst the factors that determine economic growth, fiscal policies in general are of particular interest and such fiscal-growth nexus (see Zagler and Durnecker, 2003 for a survey) is particularly important in situations of economic downturns where tax revenues tend to flee rather quickly and the spending side adjusts more slowly, which builds up larger deficits and accrues fiscal sustainability problems. On the latter, a recent paper by Afonso and Jalles (2011a) takes a longer-run perspective of fiscal sustainability, via a systematic analysis of the stationarity properties of first-differenced level of government debt series and disentangling their components using Structural Time Series Models, between 1880 and 2009 for a set of 19 countries and they conclude that the solvency condition would be satisfied in mostly all cases, and, therefore, longer-run fiscal sustainability could not be rejected.

<sup>2</sup> For instance, Shibata and Tian (2012) examine optimal debt reorganization strategies in the presence of agency problems in times of financial distress.

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