



# Public debt and economic growth: Is there a causal effect?



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## ABSTRACT

This paper uses an instrumental variable approach to study whether public debt has a causal effect on economic growth in a sample of OECD countries. The results are consistent with the existing literature that has found a negative correlation between debt and growth. However, the link between debt and growth disappears once we correct for endogeneity. We conduct a battery of robustness tests and show that our results are not affected by weak instrument problems and are robust to relaxing our exclusion restriction. Our finding that there is no evidence that public debt has a causal effect on economic growth is important in the light of the fact that the negative correlation between debt and growth is sometimes used to justify policies that assume that debt has a negative causal effect on economic growth.

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## 1. Introduction

Do high levels of public debt reduce economic growth? This is an important policy question. A positive answer would imply that, even if effective in the short-run, expansionary fiscal policies that increase the level of debt may reduce long-run growth, and thus partly (or fully) negate the positive effects of the fiscal stimulus. Most policymakers do seem to think that high public debt reduces long-run economic growth.<sup>1</sup>

While a negative effect of government debt on long-run growth is consistent with both neoclassical and endogenous growth models (Diamond, 1965; Saint-Paul, 1992), back-of-the-envelope estimates suggest that the standard crowding out channel is unlikely to be quantitatively important (Panizza and Presbitero, 2013). Public debt could have a larger negative effect on economic outcomes if it affects the productivity of public expenditures (Teles and Cesar Mussolini, 2014), increases uncertainty or creates expectations of future financial repression (Cochrane, 2011), and increases sovereign risk (Codogno et al., 2003), leading to higher real interest rates and lower private investment (Tanzi and Chalk, 2000; Laubach, 2009). However, it is also possible to think about scenarios in which expansionary fiscal policies that lead to debt accumulation but avoid protracted recessions end up having a positive effect on both short and long-term growth (DeLong and Summers, 2012).

Theoretical arguments that suggest that high public debt has a negative effect on GDP growth are in line with a growing empirical literature which shows that there is a negative non-linear correlation between public debt and economic growth in

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<sup>1</sup> For instance, the former Director of the IMF Fiscal Affairs Department argued that: “in addition to problems for growth arising from a debt crisis, one should also be worried about problems for growth arising from high, even if stable, debt.” (Cottarelli, 2011).

advanced and emerging market economies (Reinhart and Rogoff, 2009, 2010a,b; Reinhart et al., 2012; Kumar and Woo, 2010; Cecchetti et al., 2011; Checherita-Westphal and Rother, 2012; Furceri and Zdzienicka, 2012).<sup>2</sup>

Correlation, however, does not necessarily imply causation. The link between public debt and economic growth could be driven by the fact that it is low economic growth that leads to high levels of debt (Reinhart et al., 2012). Empirically, measuring debt as a ratio to GDP automatically creates a negative correlation between debt and growth and this negative correlation can be amplified by the presence of automatic stabilizers or by discretionary countercyclical fiscal policy. Alternatively, the observed correlation between debt and growth could be due to a third factor that has a joint effect on these two variables (for instance, a banking crisis could jointly cause a growth slowdown and a sudden debt explosion (Reinhart and Rogoff, 2011)). Establishing the presence of a causal link going from debt to growth requires finding an instrumental variable that has a direct effect on debt but no direct (or indirect, except for the one going through debt) effect on economic growth.

In this paper, we propose a new instrument for public debt and show that instrumental variable regressions do not provide evidence that public debt causes growth in a sample of OECD countries. Our instrumental variables strategy relies on the fact that, in the presence of foreign currency debt, changes in a country's exchange rate have a direct and mechanical effect on the debt-to-GDP ratio. We thus collect detailed data on the currency composition of public debt and match them with data on bilateral exchange rates to build a variable that captures valuation effects brought about by exchange rate movements.

The first requisite for a good instrument is relevance: the instrument needs to be correlated with the endogenous variable. A battery of weak instrument tests confirm that our instrument is relevant. However, by itself, our valuation effect variable does not satisfy the second requirement for a good instrument (instrument exogeneity). Valuation effects are mechanically correlated with the exchange rate which, in turn, may affect economic growth (Rodrik, 2008). Our instrument is also correlated with the share of foreign currency debt, and the latter may have an effect on economic growth, perhaps through increased macroeconomic volatility (Eichengreen et al., 2005). We address these issues by controlling for debt composition and for the effective exchange rate. We also use a Bayesian approach developed by Kraay (2012) to show that small violations of our exclusion restriction do not affect our results.

In order to compare our results with those of the existing literature, we build on the influential paper by Cecchetti et al. (2011). Our paper is also closely related to the historical work of Reinhart and Rogoff (2009, 2010a,b). Our scope, however, is narrower than that of these papers. In particular, we concentrate on government debt and, unlike Cecchetti et al. (2011) and Reinhart and Rogoff, we do not explore the complex interactions between private and public debt.

## 2. Addressing endogeneity

In this section we discuss the endogeneity problem that affects the literature on debt and growth, assess the likely direction of the bias, describe how the existing literature dealt with endogeneity, and then introduce our instrument.

The easiest way to describe the endogeneity problem and assess the likely direction of the bias is to use a simple bivariate model in which growth ( $G$ ) is a function of debt ( $D$ ):

$$G = a + bD + u, \quad (1)$$

and debt is a function of growth:

$$D = m + kG + v. \quad (2)$$

The OLS estimator of  $b$  is then given by:

$$\hat{b} = \frac{b\sigma_v^2 + k\sigma_u^2}{\sigma_v^2 + k^2\sigma_u^2},$$

and the bias of the OLS estimator is:

$$E(\hat{b}) - b = \frac{k(1 - bk)}{\sigma_v^2/\sigma_u^2 + k^2}. \quad (3)$$

Since stability requires that  $bk < 1$ , Eq. (3) shows that OLS estimations are unbiased if and only if  $k = 0$ . (i.e., if debt is not endogenous). Moreover, if  $k$  is negative (as it is likely to be), OLS estimates are negatively biased.

Of course, we are not the first to recognize that debt is likely to be endogenous. The existing literature tries to address endogeneity by using lagged values of the debt-to-GDP ratio (Cecchetti et al., 2011), GMM estimations with internal

<sup>2</sup> While many empirical papers identify non-linearities in the relationship between debt and growth, there is no paper that makes a clear theoretical argument for the presence of such non-linearities in advanced economies (Greiner, 2012). There is a well-established strand of literature on the asymmetric effects of fiscal policy which could motivate a non-linear effect of public debt on output growth (Sutherland, 1997; Perotti, 1999). Moreover, non-linearities may arise if there is a tipping point of fiscal sustainability (Ghosh et al., 2013; Greenlaw et al., 2013). However, we are not aware of any theoretical models incorporating such debt tipping points in a growth framework.

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