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Public debt and long-term economic growth: the research and policy agenda[1]

1 Introduction

I discuss the theoretical and empirical literature on public debt and economic growth and draw some policy implications.

Section 2 suggests that the growth effect of public debt is likely to be small for countries that are far from their debt limit. It can, instead, be substantial for countries that face debt sustainability problems. It would be wrong, however, to only focus on debt levels to assess debt sustainability. Debt composition and many institutional arrangements are as important the level of debt. As a consequence, there are countries that face debt crises when debt hits 60% of GDP (Argentina in 2001) and countries that do not have any problem in rolling over debt ratios which are well above 150% of GDP (Japan).

Section 3 describes the empirical literature and shows that, while there is strong evidence that public debt is negatively correlated with economic growth, we still do not have any evidence of a causal effect of debt on growth or of a non-linear relationship between debt levels and economic growth. Section 4 discusses various measures of public debt and concludes that, because of data availability, the empirical literature on debt and growth is probably focusing on the wrong definition of public debt.

Section 5 asks whether countries should react to a sudden jump in debt with a program of rapid fiscal consolidation. It argues that countries that do not face sustainability problems should do either nothing or do very little. Countries that are close to their debt limit, instead, face more complicated tradeoffs.

2 Theoretical considerations

What does economic theory tell us about the relationship between public debt and economic growth?

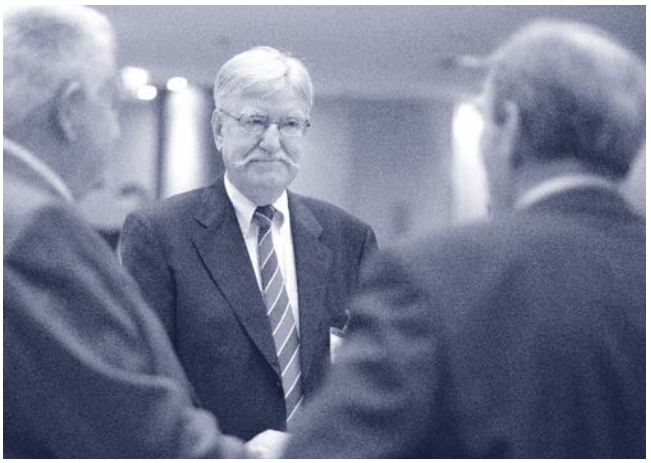
The debt fairy: long versus short-run effects

In their debt fairy parable, Elmendorf and Mankiw (1999) assume that government expenditure in goods and services is fixed and they study what happens if the government decides to temporarily reduce taxes and finance its expenditure by issuing debt. If Ricardian Equivalence does not hold, *short-run* output is demand-determined and the increase in public debt associated with the fiscal deficit will have a

[1] *Delivered at the 43rd Economics Conference of the Oesterreichische Nationalbank, Vienna, June 15–16, 2015. I would like to thank Martin Summer for inviting me to the conference and conference participants for useful comments and suggestions. Sections 2, 3, and 4 of this paper draw heavily on joint work with Andrea Presbitero (specifically on "Public Debt and Economic Growth in Advanced Economies: A Survey," published in the Swiss Journal of Economics and Statistics). The usual caveats apply.*

positive effect on disposable income, aggregate demand, and overall output. The positive effect will be particularly large if output is far from capacity and the central bank does not respond to the expansionary fiscal policy with an increase in the policy interest rate.

Things are different in the *long-run*. If Ricardian Equivalence does not hold, the decrease in public savings brought about by a higher budget deficit will not be fully compensated by an increase in private savings, resulting in lower total investment, either at home or abroad. Lower investment at home will have a negative effect on GDP, as it will lead to a smaller capital stock, higher interest rate, lower labor productivity and wages. Lower foreign investment (or higher foreign inflows), instead, it will have a negative effect on foreign capital



income and will thus lower the country's future GNP. This negative effect of an increase in public debt on future GDP (or GNP) can be amplified by the presence of distortionary taxes.

Panizza and Presbitero (2013) use Elmendorf and Mankiw's (1999) back-of-the-envelope calculations for the US economy and estimate that increasing debt by 100% of GDP would reduce annual GDP growth by approximately 20 basis points in the first twenty years.

The conventional split between the short and long-run effects of debt disregards the fact that protracted recessions may reduce future potential output (as they increase the number of discouraged worker, with the associated loss of skills, and have a negative effect on organizational capital and investment on new activities).[2] In this case, running fiscal deficits (and increasing debt) may have a positive effect on output in both the short and long-run. DeLong and Summers (2012) argue that in a low interest rate environment expansionary fiscal policy is likely to be self-financing.

Confidence

The debt fairy parable rules out uncertainty and assumes that the government will always be able to borrow at a "safe" interest rate.[3] The negative growth effects of public debt could be much larger if high debt increases uncertainty, leads to expectations of future confiscation, possibly through inflation and financial repression (Cochrane, 2011a,b), or is subject to self-fulfilling runs. In these cases, higher debt could have a negative effect, even in the short-run, because uncertainty will lead to lower investment and higher interest rates (this is what Paul Krugman calls the *Confidence Fairy* effect).

High levels of debt may also pose constraints on a country's ability to conduct countercyclical policies, and thus increase output volatility and reduce economic growth.

The relationship between debt and the ability of conduct countercyclical

[2] *There is evidence that recessions have a permanent effect on the level of future GDP (Cerra and Saxena, 2008).*

[3] *This is because the debt fairy parable implicitly assumes that the government will always satisfy its budget constraint. Therefore, the interest rate paid on government bonds does not carry any default risk.*

policies is more likely to depend on the composition of public debt than on the level of public debt. The literature on original sin, for instance, suggests that the presence of foreign currency debt limits a country's ability to conduct counter-cyclical policy (Eichengreen et al., 2007 and Hausmann and Panizza, 2011). The debt intolerance literature suggests that countries with stronger institutions can sustain higher levels of debt (Reinhart et al., 2003). These findings indicate that countries with different debt structures, institutions and monetary arrangements are likely to start facing debt sustainability problems at very different levels of debt.

De Grauwe (2011) was the first to highlight that the presence of *de-facto* foreign currency debt (because the euro cannot be printed by the national central banks that compose the euro area) was a source of financial fragility within the euro area (see also De Grauwe and Ji, 2013 and Dell'Erba et al., 2013) and to recommend that the European Central Bank should act as a lender of last resort for sovereigns facing runs on their government debt.

Non-linearities

A large number of empirical papers find that the relationship between debt and growth is non-linear and characterized by the presence of a threshold above which debt starts having a negative effect on economic growth (see below). While non-linearities and threshold effects could arise from the presence of debt overhang, it is not clear whether a debt overhang argument could be easily applied to rich economies in which the majority of debt-holders are residents (and therefore there is not an external transfer problem).

Non-linearities may arise if there is a tipping point above which public debt suddenly become unsustainable (Ghosh, et al. 2013, provide a formal model). However, I am not aware of any theoretical model that includes such tipping points in a growth framework.[4]

Summing up

Back-of the envelope calculations suggest that debt may have a negative effect on growth, but the effect is likely to be small for countries that do not face debt sustainability problems. This effect may become large for countries which are subject to default risk and (possibly self-fulfilling) debt runs. Whether a country is subject to debt risk, however, does not only depend on the level of debt but it also depends on many cyclical and structural factors.

3 Empirics: Correlations, causality and endogeneity

Reinhart and Rogoff (2010) collect annual data on debt and output growth for 20 advanced economies over 1946–2009 and split their sample into four groups: (i) country-years for which public debt is below 30% of GDP (443 observations); (ii) country-years for

[4] *Checherita-Westphal et al. (2012) develop a theoretical model in which, over the business cycle, debt can only be issued to finance public investment and the optimal level of public debt is determined by the public to private capital ratio that maximizes economic growth. With such a set-up, they show that the level of debt that maximizes economic growth is a function of the output elasticity of the capital stock. However, Greiner (2012) shows that the results of Checherita-Westphal et al. (2012) are driven by the assumption that the deficit is equal to public investment at each point in time. In such a set-up, debt is completely irrelevant and the non-linear relationship between debt and growth is given by the growth-maximizing tax rate. Greiner shows that allowing for a more general debt policy leads to a monotone and negative relationship between public debt and steady-state growth. He concludes that there is no well-specified model that can generate an inverted U-shaped relationship between debt and growth.*

which public debt is between 30% and 60% of GDP (442 observations); (iii) country-years for which public debt is between 60% and 90% of GDP (199 observations); and (iv) country-years for which public debt is above 90% of GDP (96 observations). Next, they compute median and average GDP growth for each group and show that there are no large differ-ences among the first three groups, but that average and median GDP growth are substantially lower in the fourth group.

Reinhart and Rogoff's (2010) influential paper sparked a new literature aimed at assessing whether their findings were robust to allowing for non-arbitrary debt brackets, to controlling for other variables in a proper regression set-up, and to instrumenting public debt to assess its causal effect on economic growth.

Kumar and Woo (2010), Cecchetti, Mohanty, and Zampolli (2012), and Checherita-Westphal and Rother (2012) estimate alternative versions of a dynamic growth model in which GDP growth is regressed on the initial level of per capita GDP, the ratio of public debt over GDP, and a set of controls. In general these papers find that high levels of public debt are negatively correlated with subsequent growth. Some of these papers also find non-linearities indicating that high debt has a negative effect on growth but moderate levels of debt do not reduce growth.[5]

While these papers suggest that there is a negative correlation between debt and growth, none of them provides convincing evidence that debt has a causal effect on growth. Panizza and Presbitero (2014) try to assess causality by instrumenting public debt with the valuation effects brought about by the interaction between foreign currency debt and movements in the exchange rate. The paper shows that the negative correlation between debt and GDP growth vanishes in the instrumental variable regressions.

Cross-country heterogeneity may lead to large biases in the estimated relationship between debt and growth. New panel time series econometric techniques allow moving beyond simple interactive effects and dealing explicitly with a variety of issues related to unobserved heterogeneity and cross-section dependence. Eberhardt and Presbitero (2015) apply these techniques to estimate the relationship between debt and growth in a large sample of advanced and developing countries. Their findings cast several doubts on the pooled model approach used by the majority of the papers that study the empirical relationship between debt and growth. Along similar lines, Kourtellos et al. (2015) use a structural threshold regression model to study the heterogeneous effects of public debt on growth. They find strong evidence for threshold effects based on democracy but no evidence on non-linearities in debt levels.

4 What is public debt anyway?

One issue that is rarely discussed in the empirical literature on the relationship between public debt and economic growth relates to the definition of debt itself. In particular, should researchers focus on gross or net debt? Should they concentrate on explicit debt, or also consider the government's implicit liabilities? Should standard measures of public debt also include the expected value of the government's contingent liabilities? These are diffi-

[5] *Panizza and Presbitero (2013) provide a detailed discussion of these results and conclude that there is no strong evidence of non-linearities and common debt thresholds.*

cult questions for which we do not have clear answers.

The difference between gross and net debt can be very large. OECD estimates show that at the end of 2012, average gross debt in OECD countries was close to 110% of the group's GDP, but net debt was almost 40 percentage points lower than gross debt (table 1 in Panizza and Presbitero, 2013). OECD data include 8 countries for which the difference between gross and net debt is greater than 50% of GDP and 2 countries for which the difference is greater than 100% of GDP. Moreover, there are 5 OECD countries with positive gross debt but negative net debt (in these countries the government's financial assets are larger than the government's liabilities).

While net debt may seem the best measure of government indebtedness, calculating net debt requires a precise evaluation of the government's assets and liabilities. This is a difficult exercise, full of practical and conceptual challenges. As a consequence, while the definition of gross debt is fairly homogenous across countries, each country has its own definition of net debt. Even netting cross-holdings of public sector bonds by separate public entities, and between national and subnational governments is not a simple exercise.[6]

While net debt is usually much lower than gross debt, measures of debt that include the government's future implicit liabilities would yield much higher debt ratios. Hagist et al. (2009) estimate the net present value of future government liabilities and revenues and use the difference between the net present value of future liabilities and revenues to build a measure of implicit government debt. Their calculations suggest that the total debt-to-GDP ratio is often twice as large as gross debt and, in some cases, more than five times the level of the explicit debt-to-GDP ratio.[7] Kotlikoff (2015) suggests

that – thanks to its pension reform – Italy is the advanced economy with the lowest fiscal gap and concludes that: "it's a strange world in which Italy, the developed world's most fiscally responsible country, has to be lectured on fiscal prudence by countries in far worse fiscal shape."

Another problem with the calculations of standard debt-to-GDP ratio figures has to do with sudden public debt explosions linked to the presence of a large stock of private debt. Before the financial crisis, Spain, Ireland, and Iceland were deemed to have solid public finances. It was the economic crisis and the implosion of their banking sys-

[6] *Cowan et al. (2006) show that social security reforms can have very large effects on debt ratios even when they have no effect whatsoever on government net assets.*

[7] *There is also the issue of institutional coverage. Should we focus on central government debt or on general government debt, including debt issued by local governments? Dippelsman et al. (2012) conduct an exercise for Canada and show that, depending on the level of aggregation, in 2010 the Canadian debt-to-GDP ratio ranged between 38% and 104%. They suggest that headline indicators should focus on the broader concept of gross debt. However, very few countries report the data necessary to compute this broad measure of debt.*

tem and that led to a sudden increase in public debt.[8]

Since net debt is hard to compute and rarely comparable across countries, most papers that study the relationship between debt and growth use gross debt; even if this measure of debt is not a good indicator of the government's financial situation.[9]

5 Living with high debt?

In 2007, average public debt in the group of advanced economies that are members of the OECD was 72% of GDP. By 2012, average debt had increased by 34 percentage points (a 50% increase) to 106% of GDP.

A key policy question is whether these countries should live with high debt for an extended period of time or they should try to reduce debt as fast as possible. Section 3 suggests that empirical studies are unlikely to help us to answer this question. We know that public debt is correlated with lower growth, but we do not know whether the relationship is causal and if there is a threshold above which public debt becomes and drag on growth.

Theory, instead, is clearer. It suggests that public debt will have a small negative effect on growth in countries which are far from their debt limits (i.e., in countries where solvency is not an issue) but that the drag on growth can be large in countries which are close to their debt limit. These results are consistent with Eberhardt and Presbitero's (2015) finding that there is substantial heterogeneity in the cross-country relationship between debt and growth.

Theory is also specific about the mechanisms that reduce growth in the first group of countries: (i) higher equilibrium interest rates that crowd out of private investment and (ii) future tax distortions. High interest rates, however, are currently not a problem for countries with strong fiscal fundamentals. As these countries can borrow at either negative or very low interest rates, it is hard to justify a policy of rapid debt reduction on the basis that high debt is crowding out private investment through the interest rate channel. In fact, given that many advanced economies facing infrastructure bottlenecks, it would seem that now is the right moment to issue debt to finance much needed infrastructure projects. It is hard to think that in countries like Germany and the USA there are no public investment projects that have a return which is greater than their current borrowing costs. As investment is the most productive component of public sector expenditure,

[8] *Campos et al. (2006) provide a systematic analysis of the unexplained part of public debt.*

[9] *One reason for focusing on gross marketable debt has to do with the fact that the government needs to refinance all of its debt. Large refinancing needs may erode investors' confidence and ignite a vicious circle which could ultimately lead to a debt crisis. Note that even data on gross debt are not strictly comparable, as definitions of government vary across countries. Finally, it is now recognized that vulnerabilities depend on both debt levels and debt composition (see, for instance, Inter-American Development Bank (2006)) and, unfortunately, it is very hard to find cross-country data on the composition of public debt in advanced and developing economies.*

such a policy could stimulate aggregate demand in the short-run and increase productivity and growth in the long-run.

What about the growth effects of the distortionary taxes needed to repay the debt? This is indeed a cost of high debt. However, front-loading fiscal consolidation only brings this problem forward (Ostry et al., 2015 provide a formal model). Why should we, in order to avoid distortionary taxes in the future, implement distortionary taxes now?[10] This does not mean that higher debt is good. It simply means that – once debt increases – trying to reduce it as fast as possible it may not be the best policy. This may seem to be counterintuitive, but think of it as driving on ice. The best policy is to drive slowly. However, if you find a patch of ice while driving at high speed, you do not want to touch the brakes.

Things are different for countries that are close to (or above) their debt limit. In this case, the costs of debt in terms of uncertainty and rollover risk are high. The best policy would be to have policies that slowly and credibly reduce debt, together with a lender of last resorts that rules out self-fulfilling crises (De Grauwe, 2011). However, a lender of last resort may not be available or credible (Bacchetta et al., 2015). In this case rapid debt reduction may be the best option. It is not obvious, however, if debt reduction should happen through fiscal consolidation or debt restructuring, especially because very few countries are able to implement large and persistent fiscal consolidation programs (Eichengreen and Panizza, 2014).[11]

6 Conclusions

There is strong evidence that public debt is negatively correlated with economic growth, but at this stage there is no evidence of a causal relationship between debt and growth. Thresholds effects are likely to exist, but there is substantial cross-country heterogeneity and the level of public debt is only one factor among many that contributes to debt risk. Therefore, it is wrong to rely on one-size-fits-all debt thresholds to assess debt sustainability.

Countries that are far from their debt limit should not respond to a sudden jump in their debt ratios with a tight fiscal consolidation program. Such a policy would only bring forward the costs of high debt.

Countries that are close to their debt limit face more complicated trade-offs because without a consolidation program they could lose market access. However, the consolidation program may shrink the economy and amplify the debt problem. The first best policy would be a credible program of slow debt reduction with the support of a lender of last resort which rules out a self-fulfilling run. Such a policy, however, is not always feasible. In such a situation, the country should explore alternative policies, all of them difficult and costly.

This is when high public debt hurts.

[10] *Such a policy would make sense only if we think that the fiscal situation is bound to deteriorate over time and therefore future austerity will need to be more distortionary than austerity today (this may be the case in ageing societies, see Jimeno in this volume).*

[11] *For a discussion of sovereign debt restructuring see Panizza (2013) and CIEPR (2013).*

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