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THE FISCAL MULTIPLIER IN A TIME OF MASSIVE PUBLIC DEBT: THE EURO AREA CASE

Radu Vranceanu* **and Damien Besancenot†**

Abstract

This paper argues that in Euro-area economies, where the ECB cannot bail-out financially distressed governments, the fiscal multiplier is adversely affected by the amount of public debt. A regression model on a panel of 26 EU countries over the last 16 years shows that a 10 percentage point increase in the debt-to-GDP ratio is connected to a slowdown in annual growth rates of 0.28 percentage point. Furthermore, the effectiveness of fiscal spending is adversely affected by the amount of public debt.

Keywords: Fiscal multiplier, Euro-area, Public debt, Illiquidity, the Great Recession
JEL Classification: E62, G01, C23

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1 Introduction

The 2007-2009 Great Recession left behind a dramatic legacy: creeping growth and high long-term unemployment rates, a devastated banking sector and huge public debts. Three years later, Euro area countries are facing the worst difficulties. Financial instability and poor growth are now compounding their effects in the most disruptive way. With ECB target interest rate close to zero, several economists echoed by many EU political leaders argue that only a massive fiscal stimulus can revigorate the weakest economies. Krugman (2010) summarizes the basic rationale behind this traditional Keynesian recommendation: low (short-term) interest rates combined with a depressed economy signal an excess of savings over investment opportunities; in this context, a higher public spending and the connected deficit should not push up interest rates, but stimulate growth.[1]

The Keynesian policy framework was developed under the assumption that bonds and money are perfect substitutes; in particular, bonds were seen as the risk-free asset. The contemporary DSGE new Keynesian macroeconomics also builds on the assumption that the central bank can maintain short and long-term interest rates on a pre-comitted schedule (see Woodford, 2010). Yet these days are gone. Public debt is no longer seen as the perfect hedge against financial risks, in particular in Euro area countries where the central bank cannot monetize public debt. If the public debt is too high, small increases in this debt, triggered by fiscal stimulation of the economy, might bring about large variations in risk-adjusted interest rates. The culprit is the illiquidity risk: if investors loose confidence in a government and refuse to hold its debt, the debt service increases and pushes the debt on an unsustainable path.[2] As an example, in 2011 and 2012, Italy, one of the four largest Euro area economies, have seen yields on 10-year Treasury bonds crossing the 7% bar for several times although it is running primary surpluses. Furthermore, in "high-risk"

[1] In practice, on June 28-29, 2012, the European Council approved the *Compact for Growth and Jobs* expected to boost the financing of the EU economy by additional 120 billion euros.

[2] See Besancenot et al. (2004) for a small dynamic model, where a small and remote risk of unsustainability can trigger imediate illiquidity default on public debt.

countries, risk premia on public and corporate debt are highly correlated. As a consequence, a higher corporate interest rate would entail the crowding-out of private investment. If the "financial crowding-out" effect takes over the direct public spending effect, the spending multiplier can be smaller than one.

In this paper, we aim to provide an analysis of the fiscal multiplier that takes into account the financial risk associated to large public debts. After introducing a spending multiplier that incorporates an additional "financial crowding-out" effect, we study the relationship between public spending, growth and public debt using a panel of 26 EU countries over the period 1996-2011. Both growth and the growth effect of a fiscal stimulus appear to be weaker in high-debt countries.

Recently several empirical papers have investigated the relationship between growth and debt in the long run. For instance Reinhart and Rogoff (2010) analyze data on forty-four countries over two hundred years. The show that the median growth rate is lower by one percentage point in countries/periods where the debt-to-GDP is above 90% as compared to countries/periods where the debt-to-GDP is below 90%. Kumar and Woo (2010) analyze a panel of advanced and emerging economies over four years; they reveal a relationship between initial debt and growth: on average, a 10 percentage point increase in initial debt-to GDP is associated to a slowdown in annual real par capita GDP growth of 0.2 percentage point per year. There is no explicit model of for this negative relationship between growth and debt, but, as noticed by Cottarelli and Jaramillo (2012, p.9), who reviewed this empirical literature, "high debt is expected to result in lower growth because of crowding-out effects on private investment".

2 Theory: the "augmented" spending multiplier

We start with the textbook IS condition:

$$Y = c[Y - T(Y)] + I(i) + G, \tag{1}$$

where Y stands for the national income, c is the marginal propensity to consume (constant), with $c < 1$, T are taxes as a function of income, with $dT/dY = T_Y < 1$, and G denotes public spending. The public deficit is $D = G - T(Y)$. Private investment I is is represented as a function of i, the interest rate on corporate projects, with $dI/di = I_i < 0$. The price level is assumed to be constant and inflation expectations are zero.

Let us denote by π the (subjective) probability of default on the public debt and by ρ the risk-free interest rate (constant). Without losing much explanatory power, we can assume that in the event of default the debt residual value is zero (i.e., the haircut is 100%). With risk-neutral investors, the no-trade off condition implies a risk-adjusted interest rate on public debt r defined by:

$$1 + r = \frac{1 + \rho}{1 - \pi}. \tag{2}$$

It turns out that the risk-adjusted interest rate on public debt is a convex, increasing function in the default probability π, $r = r(\pi)$. If we agree that, at least for high levels of debt, the probability of default is a linear function in the amount of the debt, it follows that the interest rate is a convex function in D, $r = r(\pi(D))$.

In Europe, many corporations depend on public orders, subsidies and state guarantees. Under imperfect information, many investors use the country risk as a proxy for corporate risk, in particular for small, non listed firms. Furthermore, when a rating agency downgrades a country, chances it will downgrade its best companies are high.[3] Hence, we can assume that the interest rate on corporate debt and interest rates on public debt are strongly correlated, more precisely, we assume that risk-adjusted corporate interest rate can be represented as a linear function in r, denoted $i = i(r)$. Actually, for our reasoning, it is enough if this relationship applies only to a share α of total investment, but to keep formula simple we do not add this parameter.

Given this chain of effects, we can write the corporate interest rate as a convex, increasing

[3] We checked that the correlation between the CDS spread on 10-year Treasury bonds and the three biggest industrial corporations in Spain (a "high-risk" country), in the 2010.01-2012.06 period is 0.80. If including the two main banks, the correlation rises to 0.90.

function in the debt level:

$$i = i(r(\pi(D))) = \varphi(D), \tag{3}$$

with $\varphi'(D) = \varphi_D > 0$ and $\varphi''(D) > 0$ for D large enough. Then $di = \varphi_D dD$, and given the definition of the public deficit, we have: $dD = dG - T_Y dY$.

Differentiating the equilibrium condition (1):

$$dY = c\,(1 - T_Y)\,dY + I_i \varphi_D\,(dG - T_Y dY) + dG, \tag{4}$$

we get the "augmented" public spending multiplier μ as:

$$\mu = \frac{dY}{dG} = \frac{1 + I_i \varphi_D}{1 - c\,(1 - T_Y) + T_Y I_i \varphi_D}. \tag{5}$$

The properties of the multiplier are easy to study:

- If we compare μ with the elementary multiplier $m = [1 - c\,(1 - T_Y)]^{-1}$, it can be easily checked that $\mu < m$. This is the direct consequence of the "financial crowding-out effect".
- Furthermore, if m is allays larger than one, μ can be smaller than one if the crowding out effect is strong enough, which in turn depends on the response of investment to i, and the response of corporate interest rate to public debt changes: $\mu < 1 \Leftrightarrow c < (-I_i \varphi_D)$.
- Most interesting, the $\varphi''(D) > 0$ condition suffices to have $d\mu/dD < 0$: the larger the debt, the bigger the impact of a fiscal stimulus on interest rate, and the more powerful is the crowding-out effect.

The purpose of this elementary analysis was to emphasize the financial crowding-out effect that can prevail when the debt-to-GDP ratio gets closer to the unsustainability limit, given investors' subjective assessment of the risk of default. The unsustainability limit has not been defined here, but is probably much lower for countries where the central bank cannot bail out the government, as compared to countries where the central bank can monetize public debt. A more powerful analysis would include the LM relationship, and the external sector. In an open-economy context,

a higher financial risk would contribute to depreciate the currency, and might entail a positive effect on net exports.

3 Empirical analysis

The European Union is made up of 27 countries in 2011. Our panel covers 26 countries cover the period 1996-2011; we excluded Luxemburg given its special status and small population size.[4] Data are provided by the Eurostat online database. Over the 16 years, the overall tendency of the debt-to-GDP ratio was to increase, on average from 56.6% to 65.44%, with a strong acceleration after 2007. Only six out of the 26 countries in our sample managed to reduce the debt-to-GDP ratio. The Appendix provides a summary of the data.

Besides the 11 founding members who created the Euro in 1999, six other countries joined the club later on. In the light of our analysis, this is an important institutional change insofar as at that moment they become more vulnerable to the illiquidity risk.

Denoting by $GROWTH_{it}$ - the annual real growth rate of country i at time t; DEF_{it} - the public deficit as a percentage of GDP of country i at time t; $DEBT_{it}$ - public debt as a percentage of GDP of country i at time t; and $DUMEMU$ - a dummy variable that takes the value 1 if the country is member of the Euro area, we estimate a growth equation:

$$GROWTH_{it} = C + a_0 DEF_{it} + a_1 DEBT_{it} + a_2 DUMEMU_{it} + a_3 DEBT_{it} \times DEF_{it} + u_i + \epsilon_{it} \quad (6)$$

where u_i is a country specific residual and ϵ_{it} is the "usual" residual.

We estimate equation (6) using both random and fixed-effect panel data estimators. The panel is strongly balanced; there are 405 observations (4 observations are missing for Greece (deficit, 1996-2001), 4 observations for Malta (growth, 1996-2001) and one observation is missing for Bulgaria in 1996). Table 1 presents the output of the estimation.

[4] Including Luxemburg does not change the results.

	Coefficients FE	Coefficients RE
C	6.640***	5.991***
DEF	0.959***	0.684***
$DEBT$	-0.028*	-0.029***
$DUMEMU$	-2.103**	-1.522***
$DEBT \times DEF$	-0.006***	-0.005***
σ_u	1.66	0.51
σ_ϵ	2.93	2.93
rho	0.24	0.03
R^2	0.22	0.23

Table 1. Output Estimate of the Growth Equation

(*** = significant at 1%; * = significant at 10%)

A Hausman test suggests that we can rely on the fixed-effect model to properly represent the country-level effects; for the sake of comparison we also provide the output estimate of the random-effect model.[5]

Several interesting findings can be inferred from the data:

- In line with textbook Keynesian wisdom, larger deficits (and higher spending) are associated to higher growth rates, in the year when they occur. Hall (2009) reviewed the empirical evidence for the US and concluded that, under normal circumstances, GDP rises by roughly the amount of an increase in government purchases.

- A 10 percentage point increase in the debt-to-GDP ratio would on average bring down the growth rate by 0.28 percentage point, a figure in line with the findings by Kumar and Woo (2010).

[5] The Breusch and Pagan LM test indicates that the RE effect model is better than the pooled OLS estimator.

- Most important, the positive impact of the deficit on growth is weaker when the debt is higher, a cross-effect captured by the coefficient a_3. A 10 percentage point increase in the debt-to-GDP ratio would reduce the deficit stimulating effect from 0.959 to 0.869. This result supports the financial crowding-out logic: in the previous section we argued that the spending multiplier would be lower for large public debts than for small public debts.

- Notice also that the Euro area dummy seems to have a dramatic impact on growth. In other words, EU countries outside the Euro-area tend to outperform Euro member countries.

4 Conclusion

Whether fiscal stimulus can foster growth or not, it depends to a large extent on the response of long-term interest rates and the strength of the crowding-out effect on private investment. In this paper, we argue that the interest rate response depends on investors' assessment of the government's financial stability. For very large public debts, a positive deficit and additional debt might entail a substantial rise in interest rates and a very powerful crowding-out effect that can offset the direct effect of additional spending.

We back this rationale with empirical evidence on 26 European economies over the last 16 years, including the post-recession, high-debt years. It turns out that a large public debt not only has an adverse effect on growth, but also it reduces the positive effect of a given fiscal stimulus. A 10 percentage point increase in the debt-to-GDP ratio would reduce the deficit stimulating effect from 0.959 to 0.869.

The policy implications are straightforward: If high-debt European economies want to stimulate growth, for the time being solutions should be sought on the structural reforms side.

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Appendix. Summary statistics for 26 EU member countries

Note: (a) - 1997; (b) - 2001-2011.

Country	Debt-to-GDP 1996	Debt-to-GDP 1996	Growth rate Av.1996 – 2011	Deficit-to-GDP Av. 1996 – 2011	EMU (year)
Austria	68.1	72.2	2.2	2.2	1999
Belgium	127.2	98.0	1.9	1.5	1999
Bulgaria	108.3[(a)]	16.3	2.6	0.1	–
Cyprus	53.1	71.6	3.0	3.3	2008
Czech Rep.	11.9	41.2	2.8	3.9	–
Denmark	69.4	46.5	1.3	1.0	–
Estonia	7.6	6.0	5.0	0.2	2011
Finland	57	48.6	2.8	1.9	1999
France	58	85.8	1.7	3.5	1999
Germany	58.5	81.2	1.4	2.3	1999
Greece	99.4	165.3	1.9	7.7	2001
Hungary	72.4	80.6	2.3	5.3	–
Ireland	71.7	108.2	4.7	3.0	1999
Italy	120.2	120.1	0.9	3.4	1999
Latvia	13.9	42.6	4.5	2.5	–
Lithuania	13.8	38.5	5.2	3.7	–
Malta	40.1	72.0	1.7[(b)]	5.5	2008
Netherlands	74.1	65.2	2.2	1.5	–
Poland	43.4	56.3	4.4	4.7	1999
Portugal	58.2	107.8	1.6	4.8	1999
Romania	10.6	33.3	2.6	3.8	–
Slovakia	31.1	43.3	4.3	5.7	2009
Slovenia	21.9	47.6	3.1	3.0	2007
Spain	67.4	68.5	2.7	2.7	1999
Sweden	73.3	38.4	2.7	0.7	–
UK	51.3	85.7	2.3	3.4	–

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