Debt, interest rates, and integration of financial markets

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ABSTRACT

It is commonly believed that higher budget deficits raise interest rates. However, these crowding out effects of increasing public debt have usually been found to be small or non-existent. One explanation is that on globalised bond markets interest rate differentials are offset due to financial integration. This paper tests crowding out, and measures the degree of integration of government bond markets, using spatial modelling techniques. Our main finding is that the crowding out effect of public debt on domestic long term interest rates is small: a 1% increase in the debt ratio pushes up domestic rates by 2 pp at most. Financial integration implies an important spillover effect via international bond markets, but only between OECD, and in particular EU, countries. The feedback effect from these markets on long term interest rates is as important as the domestic crowding out effect of higher public debt. Emerging markets are not as well integrated into international capital markets, causing a stronger crowding out effect.

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1. Introduction

A government running a deficit needs to turn to financial markets to place additional public debt. This supply of newly issued public bonds competes for financing with bonds issued by firms, and so pushes up long term interest rates. Since higher rates crowd out private investment, institutions like the IMF or OECD recommend consolidating public finances to harness economic growth. Despite being widely accepted in the economics profession as an important effect of public debt, there is surprisingly little robust empirical support for crowding out (Engen and Hubbard, 2004). A first explanation is that economic agents anticipate paying down currently high deficits with higher taxes in the future. Under Ricardian Equivalence, private saving fully offsets the effect of a higher deficit. However, there is by now a large body of empirical evidence that clearly refutes the zero impact of deficits on aggregate macroeconomic variables (Chung and Leeper, 2007). A second rationale for a lack of crowding out is capital mobility. Domestic and foreign agents diversify their holdings across borders, including also government bonds to their portfolio. Capital flows offset any interest rate differential following an increase in the domestic supply of government bonds. Under full capital mobility, domestic interest rates rise in step with global rates, and the crowding out effect is infinitesimally small. In practice, capital mobility is far from complete as foreign and domestic assets are imperfect substitutes due to incomplete information or risk aversion. Interest rate differentials persist when the spillover between markets is weak.

The typical empirical test for crowding out regresses a domestic interest rate on domestic public debt, and controls for spillover including proxy measures of capital mobility, such as aggregate capital flows or a composite measure of foreign debt or foreign interest rates. This supposes an identical transmission of fiscal policy across financial markets, and the focus usually is on a particular subset of OECD countries. However, the interactions between bond markets are much more complex in reality. The spillover works out on global financial markets via various channels, and affects more strongly countries that are more closely integrated. The spillover is contemporaneous for a large group of countries and feeds back to the domestic bond market.

In this paper, we follow standard practice in testing crowding out and explain nominal long term interest rates by public debt. But we control for the spillover by adding a spatial term that captures the degree of financial integration. This term models the contemporaneous co-movement of domestic and foreign interest rates, and so quantifies in a straightforward way the degree of integration of government bond markets. The spatial measure then allows calculating the general equilibrium effect of higher public debt on interest rates, taking into account the spillover to other markets and the feedback to the domestic bond market.

We use data for a panel of both OECD and emerging market economies over the period 1990–2005. Our main finding is that the

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domestic crowding effect of public debt is small but significant. It adds at most 2 basis points for every percentage rise in the debt to GDP ratio. As the correlation between global bond market returns is just 0.10, there is limited spillover on international bond markets. The reason is that emerging markets are not fully integrated in global bond markets. By contrast, we find bond markets to be more strongly integrated among OECD, and especially EU, countries. The feedback effect from these markets on long term interest rates is as important as the domestic crowding out effect of higher public debt. Spillover reflects deep economic integration but also economic co-movement in major crisis moments. Various measures of cross-country linkages give broadly similar results. The findings are also robust to alternative specifications and data definitions.

The paper is structured as follows. In Section 2, we discuss a simple theoretical model for testing crowding out and measuring the effects of financial integration. We then continue in Section 3 by discussing the results of the spatial panel model, and provide several robustness checks in Section 4. The final section summarises the main results, and discusses some policy implications.

2. Financial crowding out in open economies

2.1. Financial crowding out

Firms raise capital on stock or bond markets to invest in new capital stock (K). A government running a deficit, just like a private investor, needs to turn to financial markets to finance debt (B) by giving out more bonds. We can illustrate the effects of crowding out with an aggregate (Cobb Douglas) production function (Ball and Mankiw, 1995; Elmendorf and Mankiw, 1999). This production function combines labour L and capital K to produce output Y:

$$Y = AK^{\alpha}L^{1-\alpha}. \tag{1}$$

A is the coefficient of total factor productivity and α is the elasticity of capital. Total capital income, as a share of output is equal to α, with MPK the marginal productivity of capital:

$$\alpha = MPK.K / Y. \tag{2}$$

The interest rate is determined by the marginal productivity of capital, so that

$$r = MPK = \alpha Y / K = \alpha A \left(\frac{L}{K}\right)^{1-\alpha}. \tag{3}$$

An exogenous increase in public debt has the following effect on the interest rate

$$\partial r / \partial B = \left(\frac{\partial r}{\partial K}\right)\left(\frac{\partial K}{\partial B}\right) = \alpha(\alpha-1)(Y / K^2)\left(\frac{\partial K}{\partial B}\right). \tag{4}$$

As long as public debt crowds out private bonds K on capital markets $\left(\frac{\partial K}{\partial B} < 0\right)$, interest rates rise with an increase in debt. An increase in the supply of debt B will put downward pressure on the price of government bonds. The rise in bond yields makes it more difficult for the private sector to seek finance on capital markets.

This simple model has two important implications. The first is that the size of this crowding out effect is likely not very large. We calibrate Eq. (4) on aggregate Euro Area data, assuming that the capital share in output is around $\alpha = 1/3$ and using 2008 data on the net private capital stock and general government public debt.[1] If we substitute these numbers in Eq. (4) and assume that debt fully displaces private

capital $\left(\frac{\partial K}{\partial B} = -1\right)$, we get an increase in the marginal product of private capital of just 0.15% (1.5 basis points) after a 1% rise in public debt.[2] Hence, as a benchmark, full crowding out implies rather small increases in interest rates.

A second implication of Eq. (4) is that the level of interest rates is determined by the level of the capital stock (and hence the level of public debt). A standard empirical test of financial crowding out therefore takes a very simple form: it basically explains domestic interest rates (i_t) by the level of domestic public debt B_t, and some other variables X:

$$i_t = \alpha + \beta B_t + \theta X_t + \varepsilon_t. \tag{5}$$

The coefficient β measures the degree of crowding out. Empirical evidence is not clear cut on the size of this effect. A large number of studies employing various definitions of government debt and interest rates, different econometric approaches and various data sets to test Eq. (5) come to very different conclusions regarding the size and significance of β.[3]

The calibration of Eq. (4) helps in understanding why this is so. The 1.5 basis points are a maximum effect as we supposed no offsetting responses by the government's decision to lend on the demand for additional bonds. This is an extreme assumption, and private sector savings are likely to offset the additional supply of bonds. A first reason is that if economic agents recognise they face a higher tax burden in future periods to pay for the bond-financed deficit, they increase saving now. Under this hypothesis of Ricardian Equivalence, domestic private saving fully offsets the effect of the higher public dissaving. This implies $\frac{\partial K}{\partial B} = 0$ and a higher deficit does not have an impact on interest rates at all. Although many economists consider Ricardian Equivalence as a reasonable theoretical starting point, few would endorse it as a realistic description of fiscal policy. Plenty of empirical studies have examined the alternative hypothesis that fiscal policy has real economic effects. Recent evidence seems to converge on at least some expansionary effects of increased bond-financed spending (Chung and Leeper, 2007). Macroeconomic models that depart from the baseline Ricardian assumption easily find support for these real economic effects of fiscal policy. It therefore seems a reasonable assumption to reject Ricardian Equivalence.

A second reason is that financial intermediaries do not just channel the demand for bonds of the domestic private sector to match the total supply of domestic bonds but also of foreign savers. If the foreign demand for bonds offsets the additional supply, then $\frac{\partial K}{\partial B} > -1$, and crowding out is less than complete. In open economies that are economically integrated and do not impede trade or financial flows, capital moves to exploit interest rate differentials between markets. With full capital mobility, agents in each country completely diversify their portfolio. *Ceteris paribus*, they hold assets and bonds in their portfolio in proportion to a specific country's share in the global asset market. Under such conditions, the interest rate elasticity of the supply of savings is infinite, and even a small rise in B triggers a large inflow of foreign capital. The rise in domestic interest rates is a fraction of the crowding out effect on global interest rates, where this fraction is each country's share in global debt.

Capital mobility is usually not unlimited, and financial markets are far from being perfectly integrated across borders. Private agents have a preference for investment in domestic financial assets. This home bias is a consequence of barriers that distort information from foreign

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[1] The Euro Area total net private capital stock in 2008 equals 27,203 billion euro, and a 1% increase in debt equals 6056 billion euro (ECB Statistics).

[2] This financial crowding out further curtails private spending and investment. This 'resource' crowding out of deficits results in lower private sector output in the long term. See Ball and Mankiw (1995) or Elmendorf and Mankiw (1999).

[3] See the references in the overview article by Gale and Orszag (2003) and the European Commission (2004).