Federal Deficits and the Real Rate of Interest in the United States: A Note

Cebula, Richard

Jacksonville University

7 March 1986

Public Choice 53: 97-100 (1987).

Federal deficits and the real rate of interest in the United States: A note

RICHARD J. CEBULA
Department of Economics, Emory University, Atlanta, GA 30322

1. Introduction

In recent years, a number of authors have attempted to gain insights into the issue of 'crowding out' by examining the impact of federal government borrowing upon the level of interest rates. The studies conducted by Motley (1983), Makin (1983), Hoelscher (1983), Mascaro and Meltzer (1983), and Evans (1985) have all found the 3 month Treasury bill (T-bill) rate to be essentially unaffected by federal government borrowing. This finding has led these authors to the conclusion that there is no empirical evidence of a mechanism for the transmission of 'crowding out.' For example, Hoelscher (1983: 322) observes that '. . . Federal borrowing does not have crowding out effects.' And Makin (1983: 382) concludes that '. . . the results reported here regarding the possible significance of 'crowding out' can only be judged as . . . weak.'

This brief Note provides strong empirical evidence that federal government deficits *do* indeed have a positive and significant impact upon short-term interest rates; the findings in this paper thereby establish a mechanism for the transmission of crowding out. This study differs from most other studies in the adoption of two particular procedures. First, unlike most (although not all) other related studies, the rate of interest is expressed as a *real* rate; this is done in simple fashion by subtracting the inflation rate (of the GNP deflator) from the nominal rate of interest (taken to be the 3 month T-bill rate). Second, also unlike most (although not all) other related studies, the deficit is expressed in real terms and then divided by the real GNP level; expressing the deficit in this ratio form enables us to judge the deficit vis-a-vis the size of the economy which must finance it. *No* previous related study has adopted *both* of these procedures, and most studies of this topic have adopted neither procedure.

2. The model

To begin construction of the basic model, we first must define the *real rate of interest*. Following the basic, traditional definition, such as that found in Ritter and Silber (1986: 77), the '. . . real rate of interest is . . . the nominal rate minus the rate of inflation.' Consistent with the aforementioned studies by Makin (1983), Motley (1983), Hoelscher (1983), Mascaro and Meltzer (1983), and Evans (1985), we define the nominal interest rate (rnom) as the interest rate yield on 3 month T-bills. Next, we define the inflation rate (P) as the rate of inflation of the GNP deflator. Accordingly, the real rate of interest (rreal) is given by:

$$\text{rreal} = \text{rnom} - P \tag{1}$$

The variable rreal is to be the dependent variable in our analysis.

Following the studies by Evans (1985), M.akin (1983), Motley (1983), and Mascaro and Meltzer (1983), we seek to include in our model independent variables (a) to represent the federal budget deficit and (b) to allow for the impact of money supply changes over time. The initial model to be estimated is given by:

$$\text{rreal} = f(\text{M1/Y}, \text{DEF/Y}) \tag{2}$$

where rreal is the *real* rate of interest (as defined above), M1 is the *real* value of the M1 measure of the money stock, Y is the *real* GNP level, and DEF is the *real* value of the federal budget deficit. As in Evans (1985), M1 is divided by Y in order to allow for the secular drift in real GNP over time. Similarly, as noted in the Introduction and in Hoelscher (1983: 325) and Evans (1985), the real deficit also is divided by Y.

Based upon the conventional wisdom, as well as the studies by Makin (1983), Motley (1983), Mascaro and Meltzer (1983), and Evans (1985), it is expected that greater monetary growth, *ceteris paribus*, should act to reduce the interest rate:

$$\frac{\partial f}{\partial(\text{M1/Y})} < 0 \tag{3}$$

Next, on the basis of the conventional IS-LM paradigm, it is expected that:

$$\frac{\partial f}{\partial(\text{DEF/Y})} > 0 \tag{4}$$

The actual regression equation to be estimated is given by:

$$rreal_t = a_{Ot} + a_1(M1_t/Y_t) + a_2(DEF_t/Y_t) + \mu_1 \quad (5)$$

where t refers to the quarter, a_{01} is a constant term, and μ_1 is a stochastic error term. The variable M1t is the real value of the total M1 measure of the money supply in quarter t; the variable Y_1 is the real value of GNP in quarter t, expressed in annualized terms; and the variable DEF, is the real value of the federal budget deficit in quarter t, expressed in annualized terms. A positive and statistically significant value for coefficient a_2 would imply the existence of a mechanism for the transmission of crowding out.

3. Empirical results

The OLS estimate of equation (5) is given by:

$$\begin{aligned} rreal, &= 25.72 \quad 175.62\,(M1/Y,) + \quad 124.54\,(DEF/Y,), \\ &\qquad (-8.64) \qquad\qquad (+7.59) \end{aligned} \quad (6)$$

$$DF = 39,\ R^2 = 0.78,\ \bar{R}^2 = 0.77$$

where terms in parntheses beneath coefficients are t- values. Both coefficients have the expected signs and are statistically significant at far beyond the 0.01 level. Finally, the model explains nearly four-fifths of the variation in the real rate of interest over the period.

The results in equation (6) clearly indicate that the real money stock (relative to real GNP) had its expected negative impact upon the real rate of interest. This finding is consistent with various earlier studies and with the conventional wisdom. A more important conclusion – from the viewpoint of this paper – is that the real federal budget deficit (relative to real GNP) had a positive and highly significant impact upon the real rate of interest. To date, this finding is unique in the published literature. Moreover, the positive and highly significant coefficient on variable (DEF/Y() has important policy implications. In particular, it implies the existence of a mechanism for the transmission of transactions crowding out, as well as for other forms of crowding out, at least for the period 1975: I through 1985: 2.

Of course, it is well known that nominal interest rates are procyclical. Thus, during times of economic expansion and declining unemployment rates, the growing demand for money in the economy pushes interest rates upwards. On the other hand, during times of recession and rising unemployment rates, a declining demand for money results in downward pressure on interest rates. To account for the possible impact of the business cycle on

the real rate of interest (rreal), we treat rreal as a function of the unemployment rate. Our regression equation then becomes:

$$rreal = b_{0t} + b_1(M1_t/Y_t) + b_2(DEF_t/Y_t) + b_3UN_t + \mu_2 \qquad (7)$$

where b_0 is a constant, UN, is the unemployment rate of the civilian labor force in quarter t, and μ_2 is a stochastic error term. If the business cycle exercises an influence over the real rate of interest, then we would expect that:

$$b_3 < 0 \qquad (8)$$

The OLS estimation of equation (7) is given by:

$$\begin{aligned} rrealt = 24.97 - & \underset{(-8.40)}{172.54\ (M1/Y,)} + \underset{(+7.40)}{123.05\ (DEF/Y,)} \\ & 0.1485UNt' \quad DF = 83,\ R^2 = 0.79,\ \bar{R}^2 = 0.77 \\ & (-0.38) \end{aligned} \qquad (9)$$

The findings in (9) indicate that the business cycle has a negligible impact upon the *real* rate of interest. On the other hand, both the monetary variable (M1/Yt) and the deficit variable (DEF/Yt remain highly significant, as in equation (6). Hence, even after allowing for the potential role of the business cycle, it appears that federal budget deficits have a significant positive impact on the real rate of interest. This finding is strongly indicative of the existence of a crowding out mechanism and is at odds with the existing studies (see, for example, Evans, 1985; Hoelscher, 1983; Makin, 1983; Mascaro and Meltzer, 1983; and Motley, 1983).

REFERENCES

Evans, P. (1985). Do large deficits produce high interest rates? ***American Economic Review*** (March): 68-87.

I-loelscher, G.P. (1983). Federal borrowing and short-ter1n interest rates. ***Southern .Economic Journal*** (October): 319-333.

Makin, J.H. (1983). Real interest, money surprises, anticipated inflation and fiscal deficits. *Review of Economics and Statistics* (August): 374-384.

Mascaro, A., and Meltzer, A.H. (1983). Long- and short-term interest rates in a risky world. *Journal of Monetary Economics* (November): 485-518.

Motley, B. (1983). Real interest rates, money, and government deficits: Federal Reserve Bank of San Francisco. ***Economic Review*** **(Summer): 31-45.**

Ritter, L.S., and Silber W.L. (1986). *Principles of money, banking, and financial markets,* 5th **edition. New York: Basic Books.**