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INTEREST RATES AND BUDGET DEFICITS: CROSS-COUNTRY EVIDENCE FROM THE PERIOD 1924 - 1938**

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ABSTRACT

This paper examines the question of whether budget deficits raise nominal interest rates. The empirical analyses make use of cross-country data from 16 countries covering the period 1924 - 1938. Contrary to some recent studies (by e.g. Evans), it turns out that budget deficits affect nominal rates positively and thus the Ricardian equivalence proposition can be questioned.

CONTENTS

1 INTRODUCTION

This paper deals with the question of whether budget deficits raise nominal interest rates. This issue has attracted much attention, particularly since the mid 1970's when Barro (1974) put forward the famous debt neutrality proposition. Numerous tests have been designed for the proposition. One typical test is to specify a reduced-form interest rate equation so that the budget deficit variable is included. A number of tests have made use of this approach (for instance, Makin (1983), Evans (1985, 1987a, 1987b) and Wachtel and Young (1987)). Somewhat surprisingly, these studies have suggested that budget deficits do not affect interest rates, which is clearly at variance with - at least - the standard Keynesian theory.

The importance of the effects of government budget deficit on interest rates cannot be denied. Therefore, more testing needs to be done using both new data sets and new model/variable specifications. The purpose of this study is to contribute to this aim. We use a completely new data set which covers 16 countries. The data are derived from the period 1924 - 1938. This period is chosen partly because of the intention of finding data which have not been used so far and partly because these data include a considerable amount of variability, particularly in terms of the deficits variable. Obviously, these data give arise to some serious measurement problems. We have tried to overcome them by using various alternative measures (and data sources) for budget deficits so as to ensure the robustness of empirical results.

In what follows we briefly present the analytical framework used in testing the debt neutrality proposition in section 2. Section 3 discusses the data, and the empirical results are presented in section 4. Finally, section 5 provides some concluding remarks.

2 ANALYTICAL FRAMEWORK

The following simple model is used in the subsequent empirical analysis:

$$(1) \qquad R_t = a_0 + a_1 p_t^e + a_2 d_t + a_3 m_t + a_4 s_t + Z_t b_t' + u_t,$$

where R denotes the nominal interest rate, p^e the expected rate of inflation, d the budget deficit, m the real money supply, s a proxy for income uncertainty, Z a vector of (other) exogenous variables and u the stochastic error term. To be more precise, Z includes the following variables: gr = real government expenditures, wr = rate of change in real wages and tr = real trade surplus.

We are not able to discuss here the details of (1). It may suffice to refer to the papers of Makin, Evans, and Wachtel and Young cited above. We merely note that the following a priori signs are assigned for the parameters: $a_1, a_2, a_4 > 0$ and $a_3 < 0$.[1]

One of the main problems that we face in estimating (1) is the question of how to derive the values of p^e. Clearly, p^e is unobservable and it seems very difficult to derive any proxy variable for it. The standard procedure of applying some time series model in terms of p does not necessarily make sense here. The price level is almost stationary for the sample period and the rate of inflation shows only little persistence. In other words, we face the inflation forecastability problem pointed out by Barsky (1987).

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[1]The sign of the income uncertainty variable (subsequently proxied by the difference of the unemployment rate) is, in fact, ambiguous, see e.g. Makin (1983) for details. As far as the signs of gr, wr, and tr are concerned, we expect that the coefficients of gr and tr are positive while the sign of wr is either positive or negative.

We have tried several alternative solutions. First, we have proxied p^e either by p (which is the actual rate of inflation) or by p1 (which is a one-period-ahead forecast of p derived from an AR(1) model). Secondly, we have just assumed that p^e is generated by some VAR model in terms of the right-hand-side variables of (1). Hence, we simply estimate equation (1) omitting p^e and interpret the coefficients of the remaining variables as reduced-form coefficients (which reflect the respective direct effect and the additional induced inflation effect on interest rates). For details of the latter approach see e.g. Evans (1987a).

3 THE DATA

Here we give only a brief description of the basic definitions of the variables and the data sources (a more detailed data appendix including a printout of the data is available upon request from the author). To start with the definitions, R = the percentage yield on long-term government bonds, P = the price level, which is measured by the wholesale price index, $p = 100 \cdot \Delta\log(P)$, $d = D/(P \cdot \hat{y})$, where D denotes the budget deficit and $\hat{y}$ the trend output, y being actual output (GDP at constant 1929 prices), $m = M/(P \cdot \hat{y})$, where M denotes the money stock, $s = \Delta U$, where U denotes the unemployment rate, $gr = G/(P \cdot \hat{y})$, where G denotes government expenditure (in current prices), $wr = 100 \cdot \Delta\log(W/P)$ where W denotes the wage rate, and $tr = TS/(P \cdot \hat{y})$ where TS denotes the trade surplus.

As far as d is concerned, five alternative measures are applied. In the case of d1 D corresponds (roughly) to the total government borrowing requirement, in the case of d2 D corresponds (roughly) to government net lending, in the case of d3 D corresponds to the difference between government expenditure and revenues (as compiled by Mitchell (1987)), in the case of d4 $D = \Delta B$, where B denotes the government debt, and, finally, $d5 = 100 \cdot \Delta\log(B/P)$. The following three alternative concepts are used for M: M1, which includes only notes and coin, M2, which, in addition to M1, includes demand deposits in commercial banks (for most countries), and, finally, M3 which, in addition to M1, includes all deposits in commercial and savings banks.

The main data source is the Statistical Yearbook of the League of Nations. In addition, Mitchell (1983, 1986, 1987) and some national

sources have been used. All the data are annual and, in general, all variables represent period averages.[1]

[1]One may have some doubts about the quality of the data. Obviously, it is hard to find out how good the data are, but at least we have not found any obvious measurement errors (and omitting some dubious observations - for instance in terms of Germany and Italy - did not produce any difference in results). Of course, it must be admitted that, for data reasons, it was not possible to carry out more sophisticated analyses, for instance in terms of distinguishing between anticipated and unanticipated values and in terms of finding out "truly" exogenous components of different variables.

4 EMPIRICAL RESULTS

Equation (1) was estimated using both individual country data and pooled cross-country data. To save space we concentrate here solely on the results which were obtained with the latter approach (it may suffice to mention that the individual country results were very much in line with these results). Estimation was carried out using ordinary least squares with country dummies.

The results presented in Table 1 provide a summary of all the results obtained in this study. At least the following conclusions merit note: 1) The independent role of anticipated inflation cannot be discerned - the coefficient of the corresponding proxy variables can be estimated only very unprecisely. Thus, either there is no Fisher effect, or p^e cannot be forecast independently of the other right-hand-side variables. 2) The negative effect is very significant suggesting that interest rates depend very much on money supply. 3) An increase in the change of the unemployment rate clearly increases interest rates. Our interpretation of this result is that ΔU mainly reflects income uncertainty and that, in turn, depresses saving and/or the demand for bonds. 4) Budget deficits tend systematically to raise (nominal) interest rates. The sign of the respective coefficient is positive for all variable specifications, even though the t-ratio does not exceed the standard level of significance in all cases.[1] 5) Finally, the "additional" variables (gr, wr, tr) turn out to be insignificant (only in the case of the real wage variable does the t-ratio exceed the 5 per cent level). In particular, the government expenditure variable does

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[1]Notice also that residuals are somewhat autocorrelated, which biases the standard errors.

not seem to affect interest rates. Hence, only an increase in budget deficits increases nominal interest rates.[2]

[2]As far as the robustness of the above results are concerned it can be mentioned that the basic results did not change when 1) the variables were deflated by P (instead of $P \cdot \hat{y}$) and 2) when the lagged value of R_t was introduced as an additional explanatory variable.

5 CONCLUDING REMARKS

Our results show that the behaviour of nominal interest rates in the 1920's and 1938's can be reasonably well explained using a reduced-form interest rate equation. Given this equation, it turns out that interest rates have in fact reacted to budget deficits. Thus, contrary to some recent claims, it may be concluded that the Ricardian equivalence view is not supported by historical time series.

Table 1 Estimation Results with Pooled Cross-Country Data

	s	m	d	x	SEE	DW	definition of d,m and x
(1)	.07	-2.05	1.73		.67	1.20	d1,m1
	(5.32)	(8.14)	(2.21)				
(2)	.07	-2.03	1.49		.67	1.20	d2,m1
	(5.38)	(8.18)	(2.24)				
(3)	.07	-1.90	.22		.68	1.17	d3,m1
	(5.16)	(7.69)	(0.85)				
(4)	.07	-1.92	.67		.68	1.21	d4,m1
	(5.27)	(7.97)	(1.50)				
(5)	.06	-1.94	1.21		.66	1.30	d5,m1
	(3.68)	(8.33)	(2.96)				
(6)	.05	-1.94	1.10		.67	1.27	d5,m2
	(3.68)	(8.27)	(2.68)				
(7)	.06	-1.44	1.16		.70	1.41	d5,m3
	(3.85)	(6.34)	(2.66)				
(8)	.06	-1.93	1.22	-.06	.67	1.31	d5,m1,gr
	(3.89)	(7.48)	(2.95)	(0.15)			
(9)	.05	-2.06	1.10	-.02	.66	1.27	d5,m1,p
	(3.71)	(8.58)	(2.67)	(1.88)			
(10)	.05	-1.95	1.11	-.00	.67	1.30	d5,m1,p1
	(3.69)	(8.32)	(2.30)	(0.40)			
(11)	.06	-1.92	1.55	-.02	.66	1.31	d5,m1,wr
	(4.25)	(8.32)	(3.57)	(2.20)			
(12)	.06	-1.93	1.21	-.02	.67	1.30	d5,m1,tr
	(3.91)	(8.16)	(2.95)	(0.11)			

The data are unweighted and the number of observations is 219. The final sample covers the years 1925 - 1938 for all countries except Austria (1925 - 1937) and Germany (1925 - 1934). The definitions of s, m, d, and x (i.e. gr, p, p1, wr and tr) are explained in the text. In addition, all equations include 16 country dummies, which are not reported here.

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