An Empirical Note on Deficits, Interest rates, and International Capital Flows

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22 November 1988

Note

An Empirical Note on Deficits, Interest Rates, and International Capital Flows*

In recent years, a number of studies, including Paul Evans [3, 4, 5], Gregory Hoelscher [7], James R. Barth, George Iden, and Frank Russek [1, 2], Khan H. Zahid [16], John H. Makin [10], Brian Motley [14], W. D. McMillin [12], F. S. Mishkin [13], and Angelo Mascaro and Allan H. Meltzer [11], have examined the possible impact of federal budget deficits upon interest rates. Most of these studies have concluded that deficits do not exercise a significant impact upon the interest rate. As a rule, these studies are couched within a closed economic system. As Zahid [16, p. 731] observes, the literature has ignored the impact of "increased capital flows from abroad" on interest rates in the United States.

Accordingly, the purpose of this note is to examine the impact of federal budget deficits upon the rate of interest in the United States when, in addition to the usual potential interest-rate-influencing factors such as monetary policy, the budget deficit, and inflationary expectations, net international capital flows into the United States have been accounted for. Following a number of previous studies, this brief note examines the impact of deficits on long-term interest rates.

THE FRAMEWORK

We adopt a loanable-funds framework in which the nominal long-term rate of interest is determined as follows:

$$R = R\,(P,\ RSR,\ B,\ M,\ CI), \tag{1}$$

where R = the nominal long-term rate of interest; P = the expected future inflation rate; RSR = the expected real short-term interest rate; B = real borrowing by the United States Treasury; M = real purchases of securities by the Federal Reserve System, and CI = real net capital flows into the United States from other nations. The expected signs on the partial derivatives in (1) are, as follows:

(2) $$R_p > 0,\ R_{RSR} > 0,\ R_B > 0,\ R_M < 0,\ R_{CI} < 0,$$

where subscripts denote partial differentiation.

For purposes of this study, we measure federal government borrowing, B, in terms of the federal budget deficit. Given the prevailing public concern over federal budget deficits, our focus on the deficit makes our analysis timely and relevant. Furthermore, this focus on the federal deficit is consistent with the other related empirical studies (compare Evans [3, 4, 5], Hoelscher [7], Makin [10], Mishkin [13], Motley [14], McMillin [12], and Mascaro and Meltzer [11]).

Although this article resembles other related studies in its focus upon the federal deficit, it differs from these studies in its specification of the deficit. Specifically, it is commonplace in the literature to measure the deficit as simply the difference between aggregate federal outlays and receipts. By contrast, when examining the interest-rate impact of the deficit, we distinguish expressly between the *cyclical deficit* (*CD*), which is the counter-cyclically *endogenous* component of the total deficit, and the *structural deficit* (*SD*), which approximates the *exogenous* component of the total deficit. With the federal deficit so decomposed, the next section of this note includes both *CD* and *SD* and (of necessity) estimates structural equations by 2SLS.

Given the observations above, the term B in Equation (1) is replaced by *CD* plus *SD*. Accordingly, the model becomes

(3) $$R = R(P,\ RSR,\ CD,\ SD,\ M,\ CI),$$

where it is expected that

(4) $$R_P > 0,\ R_{RSR} > 0,\ R_{CD} > 0,\ R_{SD} > 0,\ R_M < 0,\ R_{CI} < 0.$$

EMPIRICAL ANALYSIS

To investigate the impact of federal budget deficits upon longer-term interest rates, we estimate two different equations. These two equations differ from one another in only one respect: International capital flows are included in one of the equations but not in the other. Comparison of the results from estimating these two different specifications permits us to infer whether net international capital flows into the United States eliminate or sharply alter any overall interest-rate impact of the deficit that appears to exist in a closed economic system.

Based upon the model in (3) and (4) and an arbitrary initial assumption (to be relaxed shortly) that $CI = 0$, the first equation we examine is given by:

(5) $$R_t = a_0 + a_1P_t + a_2RSR_t + a_3CD_t/Y_t + a_4SD_t/Y_t + a_5M_t/Y_t + u_1,$$

where Y = the seasonally adjusted middle-expansion trend GNP. The model is quarterly and covers the period from 1971:IV through 1984:IV. The subscript $_t$ refers to quarter $_t$. Following Zahid [16], we begin the study with 1971:IV since it is during this period that the system of fixed exchange rates (Bretton Woods) began to collapse. We end with 1984:IV due to data limitations with respect to expected inflation after that time (see Clifford Thies [15]).

In order to provide insights into the effects of federal budget deficits upon a variety of nominal longer-term interest rates, we let R_t assume three different forms:

(1) Aaa_t, the nominal average interest rate yield in quarter t on Moody's Aaa-rated corporate bonds, expressed as a percent per annum.
(2) Baa_t, the nominal average interest rate yield in quarter t on Moody's Baa-rated corporate bonds, expressed as a percent per annum.
(3) TEN_t, the nominal average interest rate yield in quarter t on ten-year US Treasury notes, expressed as a percent per annum.

These interest rate data were obtained from the *Economic Report of the President.*

The inflationary expectations variable (P_t) is based upon a recent survey study by Thies [15], who derives inflationary expectations data on a monthly basis. These data are potentially more useful than the Livingston survey data which, while otherwise similar to the data in Thies [15], are either semi-annual or annual and, thus, are less neatly adapted to a quarterly framework. These inflationary-expectations data are available through the end of 1984. The variable P_t represents the beginning-of-period expectation of quarter t's inflation rate. P_t is expressed as a percent per annum.

The variable RSR_t represents the ex ante real three-month Treasury bill rate in quarter t, expressed as a percent per annum. RSR_t is computed by subtracting the expected inflation rate in quarter t from the nominal average interest rate yield on three-month Treasury bills in quarter t (which rate is also expressed as a percent per annum). The data on the three-month Treasury bill rate are obtained from the *Economic Report of the President.*

As shown in Equation (5), the analysis includes measures of both the structural deficit and the cyclical deficit. The structural deficit data are based upon a 1986 study by Thomas M. Holloway [9], who provides revised and updated quarterly estimates of the seasonally adjusted structural surplus for the period beginning in 1955:I. To convert these data into structural deficit data, it was necessary to multiply the series by (-1). The cyclical deficit is simply the difference between the total federal deficit and the structural deficit.

As shown in Equation (5), the analysis also includes the variable M_t, which is used to reflect monetary policy. Following Barth, Iden, and Russek

[1, 2] and Hoelscher [7], M_t is computed by averaging the seasonally adjusted current-quarter and preceding-quarter values of the net acquisition of credit market instruments by the Federal Reserve System. This two-quarter moving average is adopted in order to allow adequate time for changes in the monetary base to influence banking system liquidity and, hence, the supply of loanable funds in the economy. These data were obtained from the *Flow of Funds Accounts* of the Federal Reserve System.

One additional and important observation is now in order. Specifically, in principle following earlier studies by Barth, Iden, and Russek [1], Holloway [9], Hoelscher [7], and Evans [3, 4, 5], the variables SD_t, CD_t, and M_t (and, later on in this note, CI_t) are all divided by the seasonally adjusted middle-expansion trend GNP in quarter t (and expressed as a percent per annum). This procedure of dividing these variables by trend GNP (Y_t) is adopted because both measures of the deficit and open market operations (and, later on in this note, net international capital flows) should all be judged relative to the size of the economy. However, it should be observed that very similar conclusions to those obtained below are also obtained if SD_t, CD_t, and M_t (as well as CI_t, later on in this note) are expressed merely in constant dollars. In any event, the data on trend GNP were obtained from Holloway [9].

Naturally, with the cyclical deficit included in the analysis, there arises the possibility of simultaneous-equation bias. This is because the cyclical deficit, by its very nature, is endogenous. Accordingly, Equation (5) is estimated using an instrumental variables technique (as well as the Cochrane-Orcutt technique to correct for serial correlation), with the instrument being the quarterly unemployment rate of the civilian labor force (lagged one quarter). The choice of instrument is based upon the fact that the lagged unemployment rate of the civilian labor force systematically explains the cyclical deficit, whereas the contemporaneous error terms in the system are not correlated with the lagged unemployment rate.[1]

The 2SLS estimates of Equation (5) for the three longer-term rates of interest, Aaa_t, Baa_t, and TEN_t, are provided in rows (1) through (3) of Table 1. As shown in the table, all of the coefficients exhibit the expected signs and are statistically significant at the 4 percent level or beyond. As for the six deficit coefficients, five are statistically significant at the 1 percent level, and one is significant at the 4 percent level. Thus, in contrast to most of the existing literature, rows (1) through (3) of the table provide strong empirical evidence that budget deficits act to raise longer-term rates of interest in the United States.

As shown in rows (1) through (3) of Table 1, when international capital flows are omitted from the system (that is, when $CI = 0$ by assumption), the deficit is shown to exercise a positive and significant effect upon R_t. Consider now the interest rate impact of the budget deficit when inter-

Table

STRUCTURAL PARAMETERS ESTIMATED BY 2SLS

Interest Rate Variable	Constant	P_t	RSR_t	CD_t/Y_t	SD_t/Y_t	M_t/Y_t	CI_t/Y_t	DW	DF
(1) Aaa_t	3.77	+0.568 (+7.13)	+0.667 (+13.78)	+0.908 (+4.98)	+0.487 (+5.00)	−0.177 (−2.16)		1.84	46
(2) Baa_t	3.99	+0.690 (+7.80)	+0.729 (+13.26)	+1.309 (+6.34)	+0.586 (+5.21)	−0.283 (−2.20)		1.85	46
(3) TEN_t	3.38	+0.962 (+4.62)	+0.293 (+3.15)	+1.162 (+3.00)	+0.344 (+2.06)	−0.82 (−3.31)		1.68	46
(4) Aaa_t	3.57	+0.597 (+8.91)	+0.629 (+14.09)	+1.05 (+6.02)	+0.259 (+2.53)	−0.093 (−0.50)	−0.244 (−3.74)	1.91	45
(5) Baa_t	3.91	0.716 (+8.55)	+0.671 (+12.24)	+1.47 (+6.87)	+0.311 (+2.54)	−0.067 (−0.52)	−0.265 (−3.32)	1.77	45
(6) TEN_t	2.02	+0.988 (+5.87)	+0.246 (+2.65)	+1.486 (+3.71)	+0.122 (+1.56)	−0.85 (−2.55)	−0.462 (−3.42)	1.78	45

[a] Terms in parentheses are t-values.

national capital flows *are* included in the system. Specifically, based upon the model in Equations (3) and (4), we now examine the following equation:

$$R_t = b_0 + b_1P_t + b_2RSR_t + b_3CD_t/Y_t + b_4SD_t/Y_t + b_5M_t/Y_t + b_6CI_t/Y_t + u_2. \quad (6)$$

In this equation, CI_t/Y_t represents the ratio of the seasonally adjusted net flow of foreign capital into the United States in quarter t to the seasonally adjusted middle-expansion trend GNP in quarter t, expressed as a percent per annum (just as CD_t/Y_t, SD_t/Y_t, and M_t/Y_t are expressed). These data (for CI_t) were obtained from the *Flow of Funds Accounts* of the Federal Reserve System.

Rows (4) through (6) of the table provide the empirical results for Aaa_t, Baa_t, and TEN_t of estimating Equation (6) by 2SLS in precisely the same fashion as Equation (5). As shown in rows (4) through (6) of the table, all six deficit coefficients exhibit the expected positive sign; in addition, five of the six deficit coefficients are statistically significant at the 1 percent level. Thus, even after allowing expressly for net international capital flows into the United States, the federal budget deficit exercises an overall positive and significant impact upon longer-term nominal rates of interest.

CONCLUSION

This note has provided strong empirical evidence that federal budget deficits in the United States exercise a positive and significant influence over longer-term rates of interest. Indeed, this overall finding is obtained

even after allowing expressly for net international capital flows into the United States. Whereas these results are at odds with most of the related literature, these results are in principle compatible with those found by Barth, Iden, and Russek [1, 2] and Zahid [16]. Finally, in closing, we again observe that very similar conclusions to those obtained here are also obtained if CD_t, SD_t, M_t, and CI_t are expressed simply in constant dollars.

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NOTES

* The authors are indebted to an anonymous referee and to Paul Evans, Gregory Hoelscher, John Makin, Brian Motley, and Khan Zahid for helpful comments. Naturally, the usual caveat applies.

1. The Hausman [6] specification test fails to reject the null hypothesis of exogeneity in either the case of P_t or RSR_t. As a result, P_t and RSR_t are treated as exogenous.

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