Federal Budget Deficits, International Capital Flows, and the Long-Term Nominal Rate of Interest in the United States

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I. Introduction

In recent years, a number of studies, including Evans [3, 4, 5], Hoelscher [7], Barth/Iden/Russek [1, 2], Zahid [16], Makin [10], Motley [14], McMillin [12], Mishkin [13], and Mascaro/Meltzer [11], have examined the possible impact of federal budget deficits upon interest rates in the United States. Most of these studies conclude that budget 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 study is to empirically 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 earlier studies, this study examines the impact of budget deficits on the nominal long-term interest rate.

II. The Framework

We adopt a fairly standard loanable-funds framework (cf. Barth/Iden/Russek [1, 2], Hoelscher [7, 8], and Zahid [16]) in which the nominal long-term rate of interest is determined as follows:

\[ R = R(P, RSR, B, M, CI) \]  

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 Reserves System
- \( CI \) = real net capital flows into the United States from other nations
Based upon the "conventional wisdom" (cf. [1], [2], [7], [8], and [16]), the expected signs on the partial derivatives in (1) are, as follows:

\[ R_p > 0, \quad R_{RSR} > 0, \quad R_B > 0, \quad R_M < 0, \quad R_{CI} < 0 \]  

(2)

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 worldwide public concern over federal budget deficits in the United States, this focus on the deficit makes the analysis timely and relevant. Furthermore, this focus on the federal deficit is consistent with the other related empirical studies (cf. Evans [3, 4, 5], Hoelscher [7], Makin [10], Mishkin [13], Motley [14], McMillin [12], and Mascaro/Meltzer [11]).

Although this paper resembles other related studies in its focus upon the federal deficit, it differs from these studies in its initial 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 initially distinguish expressly between the \textit{cyclical deficit} (CD), which is the countercyclically \textit{endogenous} component of the total deficit, and the \textit{structural deficit} (SD), which approximates the \textit{exogenous} component of the total deficit. With the federal deficit decomposed thusly, 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:

\[ R = R(P, RSR, CD, SD, M, CI) \]  

(3)

where it is expected that:

\[ R_p > 0, \quad R_{RSR} > 0, \quad R_{CD} > 0, \quad R_{SD} > 0, \quad R_M < 0, \quad R_{CI} < 0 \]  

(4)

**III. Empirical Estimation**

To investigate the impact of federal budget deficits upon long-term interest rates in the United States when international capital flows have been allowed for, we initially estimate the following equation:

\[ R_t = a_0 + a_1 P_t + a_2 RSR_t + a_3 CD_t + a_4 SD_t + a_5 M_t + a_6 CI_t + u^* \]  

(5)

where

\[ a_0 = \text{constant term} \]

\[ u^* = \text{stochastic error term} \]
The model is quarterly and covers the period from 1971:4 through 1984:4. We begin with 1971:4 because this is the period during which the system of fixed exchange rates (Bretton Woods) began to collapse. We end with 1984:4 because this is the last quarter for which our inflationary expectations data are available (cf. Thies [15]).

The variable \( R_t \) is measured by the nominal average interest rate yield in quarter \( t \) on Moody's Aaa-rated corporate bonds; \( R_t \) is expressed as a percent per annum. As defined, \( R_t \) represents the nominal interest rate yield on the highest quality long-term corporate bonds issued in the United States. These interest rate data were obtained from the *Economic Report of the President*. The inflationary expectations variable \( (P_t) \) is based upon a recent study by Thies [15], who derives inflationary expectations data through the end of 1984. The variable \( P_t \) represents the expected inflation rate during quarter \( t \) and is expressed as a percent per annum. Variable \( RSR_t \) represents the ex ante real three-month U.S. Treasury bill rate in quarter \( t \), expressed as a percent per annum. \( RSR_t \) is computed by subtracting the average expected inflation rate in quarter \( t(P_t) \) 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 were obtained from the *Economic Report of the President*.

As shown in equation (5), the analysis initially includes measures of both the structural deficit and the cyclical deficit. The structural deficit data \((SD_t)\) are based upon a 1986 study by Holloway [9], Table 3, who provides revised and updated quarterly estimates of the seasonally adjusted structural surplus. To convert these data into structural deficit data, it was necessary to multiply the series by \((-1)\). The structural deficit is an estimate of what the federal budget deficit would be after removing the automatic responses of federal receipts and expenditures to economic fluctuations. Such automatic responses include changes in the levels of income tax collections and unemployment benefits (compensation). The seasonally adjusted cyclical deficit \((CD_t)\) is simply the difference between the seasonally adjusted total federal deficit and the seasonally adjusted structural deficit. Both \( CD_t \) and \( SD_t \) are expressed in billions of 1982 dollars (U.S.).

As shown in equation (5), the analysis also includes the variable \( M_t \), which is used to reflect monetary policy (as described in Section II above). Following Barth/Iden/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 United States economy. These data were obtained from the *Flow of Funds Accounts* of the Federal Reserve System and are expressed in billions of 1982 dollars (U.S.). Finally \( CI_t \) represents the seasonally adjusted net flow of foreign capital into the United States in quarter \( t \). \( CI_t \) is expressed in
billions of 1982 dollars (U.S.). The data for $CI_t$ were obtained from the *Flow of Fund Accounts* of the Federal Reserve System.

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.

Estimating equation (5) by 2SLS yields:

$$R_t = 3.80 + 0.609 P_t + 0.565 RSR_t + 0.033 CD_t + 0.008 SD_t$$

$$-0.012 M_t - 0.008 CI_t, DW = 1.68, Rho = 0.17, DF = 45$$

where terms in parentheses are $t$-values.

As shown in equation (6), all six of the estimated coefficients exhibit the expected signs, and five are statistically significant at the one percent level or beyond. As for the two deficit coefficients, both are positive and significant at the one percent level. Thus, the results shown in equation (6) provide strong empirical evidence that budget deficits act to raise the long-term nominal rate of interest in the United States, despite the presence of international capital flows.

These same basic results are obtained if we replace $CD_t$ and $SD_t$ in equation (5) with $D_t$, where $D_t$ represents the seasonally adjusted total federal budget deficit in quarter $t$, expressed in billions of 1982 dollars (U.S.). To illustrate, we now estimate the following equation:

$$R_t = b_0 + b_1 P_t + b_2 RSR_t + b_3 D_t + b_4 M_t + b_5 CI_t + u^{**}$$

where

$$b_0 = \text{constant term}$$

$$u^{**} = \text{stochastic error term}$$

Naturally, the total budget deficit is partly endogenous. Thus, we estimate structural equation (7) using an instrumental variables technique (as well as the Cochrane-Orcutt procedure, to correct for serial correlation), with the instrument once again being the seasonally adjusted quarterly unemployment rate of the civilian labor force, lagged one quarter. The 2SLS estimate is given by:

$$R_t = 3.65 + 0.58 P_t + 0.556 RSR_t + 0.021 D_t - 0.012 M_t$$

$$-0.002 CI_t, DW = 1.65, Rho = 0.18, DF = 46$$

(-1.96)
where terms in parentheses are \( t \)-values. In this case, the coefficient on the deficit variable \( (D_t) \) is positive and statistically significant at far beyond the one percent level.

Next, it can be reasonably argued that the budget deficit, as well as open market operations (monetary policy) and the net inflow of foreign capital, should all be judged relative to the size of the economy (cf. [1], [3], [4], [5], and [7]). To do this, we divide \( D_t, M_t, \) and \( CI_t \) by variable \( Y_t \), where \( Y_t \) is defined as the seasonally adjusted trend \( GNP \) in quarter \( t \), expressed in billions of 1982 dollars (U.S.). The \( Y_t \) data were obtained from Holloway [9], Table 2. In addition, it can be reasonably argued that the capital flow variable \( (CI_t) \) is endogenous. To treat \( CI_t \) as endogenous, we adopt a second instrumental variable: the nominal average interest rate yield on ten-year U.S. Treasury notes in quarter \( t - 1 \).

The structural equation to now be considered is given by:

\[
R_t = c_0 + c_1 P_t + c_2 RSR_t + c_3 \frac{D_t}{Y_t} + c_4 \frac{M_t}{Y_t} + c_5 \frac{CI_t}{Y_t} + u^{***}
\]  

(9)

where

\[
c_0 = \text{constant term}
\]

\[
u^{***} = \text{stochastic error term}
\]

Estimating equation (9) by 2SLS, with \( D_t/Y_t \) and \( CI_t/Y_t \) both treated as endogenous and with two instrumental variables (the one-quarter lag of the unemployment rate of the civilian labor force and the one-quarter lag of the ten-year Treasury note rate), yields:

\[
R_t = 2.56 + 0.659 \quad P_t + 0.596 \quad RSR_t + 0.63 \quad D_t/Y_t - 1.64 \quad M_t/Y_t
\]

\[
-0.267 \quad CI_t/Y_t, \quad DW = 2.12, \quad Rho = -0.10, \quad DF = 45
\]

(10)

where terms in parentheses are \( t \)-values. In this estimation, the coefficient on the deficit variable \( (D_t/Y_t) \) is positive and statistically significant at beyond the one percent level. Thus, even after allowing for endogeneity of the capital flow variable \( (CI_t) \) and even after also judging the deficit (as well as \( M_t \) and \( CI_t \)) relative to the size of the economy, the deficit still exercises a positive and significant impact upon the nominal long-term interest rate.

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1 That is, the ten-year Treasury note rate is lagged one quarter.

2 Once again, we use the Cochrane-Orcutt procedure to correct for serial correlation.
IV. Concluding Remarks

This paper has provided strong empirical evidence that, even after allowing expressly for net international capital flows into the United States, federal budget deficits in the United States exercise a positive and significant influence over the long-term nominal rate of interest. This finding has several important economic implications. To begin with, since federal government budget deficits in the United States act to raise the rate of interest, the huge budget deficits being both currently experienced in and projected for the United States imply that, in the foreseeable future, the value of the United States dollar in international currency markets is likely to be higher than otherwise would be the case, and the United States trade deficit will likely be greater than it otherwise would be. To the extent that interest rates are higher in the United States than otherwise would be the case, the probability of “Third World” debt crises is also elevated. Moreover, the evidence would also imply, strictly from the United States’ perspective, the existence of crowding-out of private investment (as a result of the budget deficit), which presents a variety of short-run and long-run adverse economic consequences. For example, the crowding out of private investment reduces capital formation and economic growth in the United States and thusly also impacts upon the economic well-being of those nations economically interrelated with the United States.
References

Summary

*Federal Budget Deficits, International Capital Flows, and the Long-Term Nominal Rate of Interest in the United States*

This study examines the impact of the federal government budget deficit in the United States upon the nominal long-term rate of interest. The analysis includes international capital flows. Estimating structural equations by two stage least squares, the study finds that the deficit raises the interest rate, despite the influence of capital flows.

Zusammenfassung

*Defizite des Staatshaushaltes, internationaler Kapitalfluss und der langfristige nominelle Zinssatz der USA*


Résumé

*Déficits du budget de l’Etat, des internationaux de capitaux ainsi que des taux d’intérêts nominaux à long terme aux USA*

L’étude porte aux l’influence exercée par les déficits du budget de l’Etat aux USA sur les taux d’intérêts nominaux à long terme. L’analyse tient compte également des mouvements internationaux de capitaux. Des évaluations économétriques des équations structurelles utilisant la méthode “two stage least squares” font apparaître que le déficit provoque l’augmentation des taux d’intérêts malgré les afflux de capitaux.