# Deficits and Money Growth in the United States: A Comment

By: Stuart D. Allen and Donald L. McCrickard

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## Abstract:

Joines (1985) argues that the Federal Reserve accommodates war-induced deficit spending but not non-war-induced deficit spending. Using a first-difference form of a reaction function to obtain a stationary time series of the monetary base, we find that the Federal Reserve has accommodated federal government deficit spending in the post-World War II period.

## Article:

### *1. Introduction*

Joines (1985) has argued that there is not a positive and statistically significant relationship between non-war federal cash deficits and the rate of growth of high-powered money either before or after the establishment of the Federal Reserve system. An important empirical innovation by Joines is the separation of war expenditures from deficit spending by the construction of a non-war deficit spending variable. In his estimates of a monetary base equation, Joines finds a significant war-expenditures coefficient and an insignificant non-war deficit spending coefficient suggesting that monetary accommodation is associated with only the temporary large deficits arising from war-time expenditures.

The purpose of this paper is to show that the Federal Reserve accommodated non-war deficits in the post-World War II period. In section 2 we demonstrate that the war-expenditures coefficient is statistically insignificant when war expenditures are regressed against the deficit for either the Korean or the Vietnam War periods. Thus an adjustment of the deficit for war expenditures is unwarranted. The resulting measurement error in Joines's non-war deficit series means that his statistical inferences must be reconsidered for the post-World War II period. In section 3 we demonstrate that the monetary base is a difference stationary process. Estimating a reaction function that is first differenced and that includes real GNP growth, the rate of inflation, the change in the unemployment rate and a short-term interest rate, reveals that the Federal Reserve has accommodated deficit spending in the post-war and post-Accord periods based on any of four different measures of the deficit. Section 4 summarizes our findings.

### 2. Joines's model

The model estimated by Joines is

$$DM_t = \alpha + \sum_{i=0}^{M} \beta_i DN_{t-i} + \sum_{i=0}^{N} \gamma_i WAR_{t-i} + \psi GOLD_t + \sum_{i=1}^{P} \delta_i U_{t-i} + \varepsilon_t, \quad (1)$$

where *DM* is the dollar change in high-powered money, *DN* is the non-war cash deficit discussed below, *WAR* measures annual war spending during 1917-21, 1941-47, 1951-54 and 1966-75, *GOLD* accounts for the autonomous inflow of gold to the United States, and *U* is the unemployment rate. *M, N* arid P indicate the lag lengths for each of the independent variable— Since *DM, DN and WAR* are dollar values and not growth rates, each of these variables and *U* is weighted by the reciprocal of the trend value of nominal GNP to correct for heteroskedasticity.[1]

The correlation of 0.88 between the weighted cash budget deficit *(DEF)* and weighted war-time expenditures *(WAR)* over 1866-1983 makes it difficult to separate the effect of each variable on the increase in the monetary base.[2] As a result, Joines decomposes *DEF* into a non-war deficit component *(DN)* that is orthogonal to war-time spending and another component that is highly correlated with war spending by regressing *DEF* on *WAR* and a constant. The error term from this regression is then used as the non-war deficit measure *(DN)* in eq. (1). Such a decomposition allowed Joines to test whether the Federal Reserve accommodated (a) non-war deficits by the significance of the DN coefficient and (b) deficits arising from war expenditures by the significance of the *WAR* coefficient.

**Table 1**

**Estimates of the impact of wartime expenditures on two measures of the deficit.[a]**

| Dependent variable = *DEF* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Years | Eq. | $\alpha$ | *WAR* | $R^2$ | *SE* | *Rho* | *DW* |
| 1913–76 | (1.1) | 0.006<br>(1.11) | 0.62<br>(12.49) | 0.72 | 0.042 | | 1.52 |
| 1913–25 | (1.2) | −0.009<br>(1.49) | 0.89<br>(19.93) | 0.97 | 0.009 | 0.63 | 1.64 |
| 1937–48 | (1.3) | −0.000<br>(0.09) | 0.65<br>(8.08) | 0.86 | 0.040 | 0.44 | 1.90 |
| 1949–58 | (1.4) | −0.001<br>(0.36) | 0.13<br>(1.26) | 0.16 | 0.011 | | 2.46 |
| 1962–76 | (1.5) | 0.030<br>(1.18) | −0.33<br>(0.17) | 0.00 | 0.073 | | 2.01 |
| **Dependent variable = *DDEBT*** | | | | | | | |
| Years | Eq. | $\alpha$ | $W_t$ | $W_{t-1}$ | $R^2$ | *SE* | *Rho* | *DW* |
| 1913–76 | (1.6) | 25.53<br>(0.95) | 0.81<br>(6.80) | −0.22<br>(1.87) | 0.44 | 9.01 | 0.97 | 1.55 |
| 1913–25 | (1.7) | −0.38<br>(1.82) | 0.95<br>(22.70) | −0.25<br>(5.88) | 0.98 | 0.64 | | 1.72 |
| 1937–48 | (1.8) | 1.06<br>(0.74) | 1.11<br>(20.75) | −0.43<br>(8.13) | 0.98 | 3.81 | | 2.52 |
| 1949–58 | (1.9) | 1.11<br>(0.92) | 0.05<br>(0.54) | 0.13<br>(1.31) | 0.36 | 3.12 | | 2.36 |
| 1962–79 | (1.10) | 30.49<br>(1.92) | 0.25<br>(0.19) | −0.43<br>(0.33) | −0.05 | 18.19 | 0.75 | 2.20 |

[a] The estimation results are from regressing two measures of war expenditures on two different deficit measures. The variables include the following: *DEF*, Joines's measure of the federal government's cash deficit (weighted); *WAR*, Joines's war expenditure variable (weighted); *W*, Joines' unweighted war expenditure variable; *DDEBT*, the change in the stock of the federal gross debt. *DEF* and *WAR* are weighted by the reciprocal of the trend value of nominal GNP.
Number in parentheses below the coefficient estimates are *t*-statistics.

The results of regressing *DEF* and *WAR* for the 1913-76 period and for each war period are presented as eqs. (1.1)-(1.5) in table 1.[3] The empirical results show that the equation fits well for the two world wars, but fits poorly for the Korean and Vietnam Wars where the ratio of the standard error of the regression to the mean of the deficit is 3.2 and 2.7 in eqs. (1.4) and (1.5). More importantly, the *WAR* coefficient for the Korean and Vietnam Wars is insignificant lending no empirical support to the adjustment of the annual federal deficits for these war expenditures. This point was recognized by Joines (1984) in a working paper but was not reported in the shorter published version.[4]

We also estimated the following equation:

$$DDEBT_t = b_0 + b_1 W_t + b_2 W_{t-1} + e_t, \qquad (2)$$

where *DDEBT* is the change in the stock of debt during period *t*, W is Joines's unweighted war expenditures, and *e* is the error term.[5] Estimates of eq. (2) are shown as eqs. (1.6)—(1.10) in table 1 and reveal that the coefficients for current or lagged war expenditures are still insignificant for the Korean and Vietnam Wars.

We concur with Joines that the Fed did not monetize non-war deficits prior to 1948. The above evidence, however, suggests that deficit spending should not be adjusted for war expenditures to form a non-war deficit series in the post-war period Therefore, Joines's conclusion that tile, Fed does not accommodate non-war deficits in the post-war period must be reconsidered.

## 3. The model and empirical results

We consider a reaction function that results from the Federal Reserve minimizing a quadratic loss function of macroeconomic policy objectives to maximize its own utility function. Thus, we extend Joines's model by including three additional variables: the log of real GNP (Y), the four- to six-month commercial paper rate *(CPR)* and the log of the price level as measured by the GNP deflator *(P)* so that

$$B = f(Y, CPR, U, P, D), \qquad (3)$$

where *B* is the log of the monetary base and *D* is the log of the stock debt.

Joines's conclusion that the deficits do not contribute to monetary growth from 1954-83 is a result of his inclusion of a time trend as a right-hand-side variable because the dependent variable and the non-war deficit measure have positive trends [see Joines (1985, p. 343 and table 2, cols. 7,8)]. Nelson and Plosser (1982) and Nelson and Kang (1981,1984) have noted that inappropriate detrending can lead to misspecification. Nelson and Kang (1984) warn of the pitfalls involved in including a time trend in a model when the dependent variable is a difference stationary process and note that (p. 73) 'conventional tests for trend are strongly biased toward finding a trend when none is present ...'.

Nelson and Plosser estimate the following equation to test the difference stationarity against the time stationarity hypothesis:

$$B_t = \alpha + \gamma T + \rho_1 B_{t-1} + \sum_{j=2}^{k} \rho_j (B_{t+1} - B_{t-j}) + e_t, \qquad (4)$$

where *T* is a time trend and $e_t$ is the error term.[6] If $\gamma$ is significant and $\rho_1 \neq 1$, the dependent variable is time stationary. If $\gamma$ is insignificant and $\rho_1 = 1$, then the series is difference stationary. For the 1954-84 period, when $j = 2,...,5$, the time coefficient ($\gamma$) is equal to 0.002 with a t-statistic between 0.90 and 1.00 while the $B_{t-1}$ coefficient *($\rho_1$)* is equal to 0.97 with a t-statistic between 0.90 and 1.00 for the null hypothesis that $\rho_1 = 1$.[7] Therefore, the results consistently fail to reject the null h3rpothesis that $\gamma = 0$ and $\rho_1 = 1$.

Our conclusion concerning the significance of the debt coefficient differs from Joines's conclusion and is a result of the functional form of the model and a result of not adjusting deficits for war-time expenditures after World War II.[8] Given that the monetary base is a difference stationary process, the model to be estimated is the first difference of eq. (3). The model, therefore, becomes

$$DB_t = a_0 + a_1 DY_{t-1} + a_2 DCPR_{t-1} + a_3 DU_{t-1}$$

$$+ A_4 DP_{t-1} + a_5 DD_t + e_t, \qquad (5)$$

where *DB, DY, DP, DD, DCPR* and *DU* are the first differences of the logs of the monetary base, real GNP, the GNP deflator, and the stock of debt and the first difference of the commercial paper rate and the unemployment rate.9 The expected signs of the coefficients are $a_1, a_2, a_3, a_5 > 0$ and $a_4 < 0$.[10]

Two different measures of the stock of debt *(D)* are employed in the estimation of eq. (5): the stock of gross Treasury debt *(GD)* (see footnote 5) and the stock of net Treasury debt *(ND)* that is computed by subtracting the interest-bearing Treasury debt held by the government investment accounts from the gross debt. Alternative measures, *GD** and *ND**, are computed by adding the debt of federally-owned agencies and government-sponsored corporations to *GD* and *ND*.[11] Each of the debt measures is logged and first-differenced (indicated by a *D* prefix).

The results of estimating eq. (5) are presented in table 2.[12] The results show that the various measures of the debt are significant at the one percent level of significance for the 1948-85 and 1954-85 periods and at the five percent level of significance for a one-tailed test for the 1961-85 period.[13] The deficit coefficients are clustered between 0.25 and 0.40 which suggests that 25-40 percent of the growth rate of the debt is accommodated by the Federal Reserve. For the 1979-85 period, the growth of the debt measures averaged 14-16 percent, while the

growth of the base was 6.7 percent. The real GNP coefficients are significant in eq. (5), while the significance of the inflation and unemployment rates are dependent on the estimated time period. As an added diagnostic check, the errors were regressed against a constant and time. In all cases, the coefficient on time was not significantly different from zero. The errors were also regressed against the one- and two-period lagged errors and, except in one case, the lagged error terms are insignificant.[14] Thus, the conclusion that the Federal Reserve accommodated federal deficits in the post-Accord period is robust with respect to the choice of the measure of the debt and the estimated time period.[15]

Table 2

Estimates of monetary base reaction function.[a]

| Eq. | $a$ | $DY_{t-1}$ | $DCPR_{t-1}$ | $DU_{t-1}$ | $DP_{t-1}$ | $DND$ | $DND^*$ | $DGD$ | $GD^*$ | $R^2$ | $SE$ | $DW$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *1948–85* | | | | | | | |
| (2.1) | −0.027 | 0.97 | 0.001 | 0.007 | 0.45 | 0.33 | | | | 0.55 | 0.0254 | 1.97 |
| | (1.82) | (3.36) | (0.21) | (0.96) | (2.39) | (5.02) | | | | | | |
| (2.2) | −0.025 | 1.00 | 0.001 | 0.007 | 0.50 | | 0.25 | | | 0.51 | 0.0266 | 1.90 |
| | (1.63) | (3.42) | (0.17) | (0.90) | (2.52) | | (4.60) | | | | | |
| (2.3) | −0.026 | 0.89 | −0.001 | 0.005 | 0.41 | | | 0.38 | | 0.58 | 0.0245 | 2.09 |
| | (1.78) | (3.00) | (0.26) | (0.71) | (2.28) | | | (5.13) | | | | |
| (2.4) | −0.024 | 0.92 | −0.001 | 0.005 | 0.46 | | | | 0.30 | 0.54 | 0.0256 | 2.03 |
| | (1.60) | (3.08) | (0.26) | (0.65) | (2.43) | | | | (4.85) | | | |
| | | | | | *1954–85* | | | | | | | |
| (2.5) | −0.031 | 1.25 | 0.004 | 0.018 | 0.27 | 0.39 | | | | 0.56 | 0.0231 | 1.55 |
| | (1.84) | (3.65) | (1.19) | (2.06) | (1.14) | (3.61) | | | | | | |
| (2.6) | −0.028 | 1.23 | 0.003 | 0.015 | 0.43 | | 0.25 | | | 0.50 | 0.0246 | 1.56 |
| | (1.56) | (3.22) | (0.72) | (1.64) | (1.85) | | (2.98) | | | | | |
| (2.7) | −0.029 | 1.14 | 0.003 | 0.016 | 0.14 | | | 0.48 | | 0.59 | 0.0223 | 1.57 |
| | (1.83) | (3.61) | (1.12) | (2.10) | (0.53) | | | (3.74) | | | | |
| (2.8) | −0.027 | 1.17 | 0.003 | 0.014 | 0.26 | | | | 0.35 | 0.54 | 0.0237 | 1.57 |
| | (1.60) | (3.33) | (0.80) | (1.78) | (1.02) | | | | (3.31) | | | |
| | | | | | *1961–85* | | | | | | | |
| (2.9) | 0.005 | 0.93 | 0.005 | 0.015 | 0.05 | 0.26 | | | | 0.36 | 0.0186 | 2.04 |
| | (0.24) | (2.37) | (1.32) | (1.51) | (0.29) | (2.73) | | | | | | |
| (2.10) | 0.011 | 0.83 | 0.003 | 0.010 | 0.17 | | 0.15 | | | 0.29 | 0.0195 | 2.07 |
| | (0.49) | (1.87) | (0.83) | (1.04) | (1.13) | | (1.82) | | | | | |
| (2.11) | 0.004 | 0.91 | 0.004 | 0.016 | −0.06 | | | 0.34 | | 0.39 | 0.0181 | 2.02 |
| | (0.20) | (2.60) | (1.42) | (1.75) | (0.28) | | | (3.01 | | | | |
| (2.12) | 0.009 | 0.86 | 0.003 | 0.013 | 0.05 | | | | 0.23 | 0.32 | 0.0191 | 2.02 |
| | (0.43) | (2.12) | (1.03) | (1.31) | (0.26) | | | | (2.21) | | | |

[a]The estimation results are for eq. (5):

$$DB_t = a_0 + a_1 DY_{t-1} + a_2 DCPR_{t-1} + a_3 DU_{t-1} + a_4 DP_{t-1} + a_5 DD_t + e_t,$$

where $DB$, $DY$, $DP$, $DD$, $DCPR$ and $DU$ are the first differences of the logs of the monetary base, real GNP, the GNP deflator, and the stock of debt and the first difference of the commercial paper rate and the unemployment rate. Four different measures of $DD$ are used in estimating eq. (5): $GD$, the stock of gross Treasury debt; $ND$, the stock of net Treasury debt; and $GD^*$ and $ND^*$ which add the debt of federally-owned agencies and government-sponsored corporations to $GD$ and $ND$.

Numbers in parentheses below the coefficient estimates are $t$-statistics.

Table 3

Levels version of monetary base reaction function.[a]

| Eq. | $a$ | $T$ | $Y_{t-1}$ | $CPR_{t-1}$ | $U_{t-1}$ | $P_{t-1}$ | $ND$ | $GD$ | $R^2/SE$ | $DW/Rho$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *1948–85* | | | | | |
| (3.1) | 5.99 | −0.03 | 1.16 | 0.002 | 0.011 | 0.37 | 0.41 | | 0.98 | 1.90 |
| | (2.53) | (1.77) | (2.63) | (0.55) | (1.12) | (1.53) | (3.25) | | 0.0255 | 0.93 |
| (3.2) | −5.79 | −0.03 | 1.11 | 0.001 | 0.010 | 0.29 | | 0.48 | 0.99 | 2.00 |
| | (2.61) | (1.89) | (2.71) | (0.24) | (1.08) | (1.23) | | (3.93) | 0.0243 | 0.91 |
| | | | | | *1954–85* | | | | | |
| (3.3) | 6.80 | −0.03 | 1.33 | 0.005 | 0.019 | 0.25 | 0.39 | | 0.99 | 1.77 |
| | (3.02) | (1.76) | (3.11) | (1.02) | (1.31) | (0.84) | (2.76) | | 0.0212 | 0.88 |
| (3.4) | −6.18 | −0.03 | 1.23 | 0.004 | 0.017 | 0.13 | | 0.47 | 0.99 | 1.80 |
| | (2.93) | (1.75) | (3.09) | (0.91) | (1.80) | (0.43) | | (3.20) | 0.0208 | 0.87 |
| | | | | | *1961–85* | | | | | |
| (3.5) | −3.07 | 0.02 | 0.59 | −0.001 | 0.003 | 0.50 | 0.03 | | 0.99 | 1.82 |
| | (1.03) | (0.63) | (1.02) | (0.27) | (0.21) | (2.12) | (0.21) | | 0.0165 | 0.32 |
| (3.6) | −3.69 | 0.01 | 0.73 | 0.000 | 0.001 | 0.37 | | 0.11 | 0.99 | 1.79 |
| | (1.34) | (0.40) | (1.35) | (0.05) | (0.53) | (1.37) | | (0.66) | 0.0163 | 0.37 |

[a]The estimation results are for the levels version of eq. (5):

$$B_t = a_0 + a_1 T + a_2 Y_{t-1} + a_3 CPR_{t-1} + a_4 U_{t-1} + a_5 P_{t-1} + a_6 D_t + e_t,$$

where $B$, $Y$, $P$, and $D$ are the logs of the monetary base, real GNP, the GNP deflator and the stock of debt, and $CPR$ and $U$ are the levels of the commercial paper rate and the unemployment rate. The log of the stock of gross Treasury debt ($GD$) and of the stock of net Treasury debt ($ND$) are substituted for $D$.

Numbers in parentheses below the coefficient estimates are $t$-statistics.

The results of estimating the levels version of eq. (5) for GD and ND are presented in table 3 as eq. (3.1)-(3.6) to provide a comparison between the two functional forms. The estimates are corrected for autocorrelation by the Beech-McKinnon (1978) maximum likelihood technique. The rho values are not statistically different from one for either the 1948-85 or 1954-85 periods. Except for the 1961-85 period when the coefficients are insignificant, the results from the level equation confirm the first-difference results. The income and debt coefficients are consistently positive and significant and their coefficient estimates for the 1948-85 and 1954-85 periods are similar for both functional forms. Similar results are found but not reported for ND* and GD*.[16]

## 4. Conclusion

Joines argues that the Federal Reserve accommodates war-induced deficits but not non-war-induced deficits. Accordingly, he constructs a non-war deficit spending variable and a war expenditure variable to include in his monetary base equation. His non-war deficit variable has no significant impact on the base over the period 1866-1983. We have shown, however, that war expenditures are not statistically related to deficit spending during the Korean or Vietnam periods so that measures of the deficit should not be adjusted for war-time expenditures after World War II. We use a first-difference form of a reaction function to obtain a stationary time series of the monetary base with four different measures or the deficit to show that the Federal Reserve has pursued accommodation of federal government deficits in the post-war period.

## Notes:

[1] Joines's trend value of nominal GNP is based on regressing the logarithm of nominal GNP on a quadratic time trend. To correct for war-related heteroskedasticity, Joines multiplies the weighted war expenditures by an additional factor dependent on the estimated time period [see Joines (1985, fix 12)1 Our trend nominal GNP measure is computed as potential real GNP [Gordon (1984, table B-1)] times the GNP deflator.

[2] The correlation between *DEF* and W4 t is 0.82 for the 1917-76 period, but the correlation varies dramatically over the four war periods being 0.99 for World War I, 0.94 for World War II, 0.73 for the Korean War and — 0.18 for the Vietnam War. The negative correlation for the Vietnam period is partially a result of the ten percent tax surcharge that produced a $3.2 billion surplus in 1969 and of the 1%9-70 recession that caused an increase in the deficit as war spending was diminishing.

[3] A war period is defined to include the four years prior to and after the period of war expenditures. The World War II period ends in 1948 and the Korean War period begins i- 1949 to avoid overlapping years. We estimate the data over the 1913-76 period to cover the periods of war expenditures and so that comparable data can be employed. Pines's inclusion of off-budge* line expenditures makes it difficult to replicate his data precisely after the change in the fiscal year in 1976. This data hr..; been weighted by the trend value of nominal GNP.

[4] Joines recognized that the deficit and war expenditures were almost uncorrelated in the post-war period. Thus, he concurs with our conclusions from the table 1 results.

[5] The data for the stock of debt are June observations of the U.S. Government gross debt from the following publications of the Federal Reserve Board of Governors: *Banking and Monetary Statistics,* 1914-41 (table 146), *Banking and Monetary Statistics,* 1941-70 (table 13.2), *Annual Statistical Digest,* 1970-79 (table 28), various issues of the *Federal Reserve Bulletin,* and the *Economic Report of the President,* 1984 (table B-81). This measure of the debt is broader than Joines's *cash* deficit plus off-budget line items. For example, the total deficit (cash deficit plus off-budget items) is $78.9, $127.9 and $207.8 billion for fiscal years 1981, 1982 and 1983, while the change in the total interest-bearing public debt securities is $90.1, $144.4 and $234.9 billion for the same period. The correlation between our debt measure, *DDEBT,* and Joines's unweighted deficit measure is 0.90 for 1916-76. *DDEBT* and W are not weighted by potential nominal GNP in eq. (2). The results are not changed if the weighting adjustment is made.

[6] The monetary base data are the sum of currency held by the public and total reserves held by the banking system in June. The reserves are not seasonally adjusted nor adjusted for reserve requirement changes. Data are from pp. 590-602 of *Banking and Monetary Statistics,* 1941-1970, pp. 68-71 of *Annual Statistical Digest,* 1970-1979, and various annual issues of the *Annual Statistical Digest* and the *Federal Reserve Bulletin.* This data is slightly different from the Shughart and Tollison (1983) base data which are December observations. The conclusions are not altered by employing the Shughart and Tollison data

[7] For the 1961-84 period, the time coefficient is between 0.010 and 0.023 with a t-statistic *between* 1.29 and 1.42 except for $j = 5$ when the t-statistic is 1.96. The $B_{t-1}$ coefficient is between 0.67 and 0.84 with a t-statistic for the hypothesis that $\rho_1 = 1$ between 1.31 and 1.45 except for $j = 5$ when the t-statistic is 1.95. The t-statistics for $j = 5$ are still insignificant at the five percent level given the critical value of 2.11 for seventeen degrees of freedom.

[8] Joines corrects for heteroskedasticity by dividing the change in the dollar value of the base by trend nominal GNP. This is nearly equivalent to dividing the base by the base lagged one period and constructing a growth rate because the correlation between our measure of trend nominal GNP and the log of the base lagged one period is 0.94.

[9] GOLD is not included because the model is estimated for the post-war period. The data for real GNP, the four- to six-month commercial paper rate, the unemployment rate and the GNP deflator are the annual observations (averaged) found either in Shughart and Tollison (1983) or Gordon (1984, table 1) and updated by the 1985 and 1986 *Economic Report of the President.*

[10] The predicted signs of $a_1$, $a_2$ and $a_5$ are positive if the Fed increases the monetary base in response to an increase in demand for real cash balances during an expansion, dampers changes in interest rates and accommodates deficit spending measured as changes in the nominal debt The sign of $a_3$ is predicted to be positive if the Fed follows countercyclical policies. The sign of $a_4$ negative if the Fed attempts to offset increases in the inflation rate. Joines dropped a tagged short-term interest rate due to statistical insignificance and argues that the unemployment rate serves as a proxy for real GNP growth.

[11] We thank Douglas Joines for supplying the interest-bearing Treasury debt held by government investment account series which can be found on pp. 882-883 of the Federal Reserve Board's *Banking and Monetary Statistics,1941-70,* on pp. 214-215 of the Federal Reserve Board's *Annual Statistical Digest,* 1970-79, and in various issues of the Federal Reserve's monthly *Bulletin.* Data for the federally-owned agencies and government-sponsored corporations are found on pp. 874-881 of *Banking and Monetary Statistics,* 1941-70, on pp. 239-244 of *Annual Statistical Digest,* and in various issues of the *Bulletin.* Data are *June* observations.

[12] These results do not suffer from multicollinearity as determined by the collinearity diagnostics developed by Belsey, Kuh and Welsch (1980). Eq. (5) is estimated with the ROBUSTSE command in TSP to obtain standard errors that are heteroskedastic-consistent The White (1980) test indicates heteroskedastic errors for only the 1948-84 period as the chi-square test statistic is 6.31 for the 1954-85 period and 5.02 for the 1961-85 period, which are below the critical values at the five percent level of significance.

[13] Hamburger and Zwick (1981,1983), Levy (1981), Allen and Smith (1983) and Allen (1986) present evidence of monetary accommodation in the post-Accord period [see McMillan (1986) for additional citations). The fact that time is not appropriate to detrend the data in the levels equation does not mean that a constant term cannot appear in the first-difference equation. If the constant is omitted from eq. (5), the debt coefficient is positive and significant at the one percent level in eleven of the twelve equations reported in table 2 and positive and significant at the five percent level for the remaining equation.

[14] When Joines includes time as a right-hand-side variable to detrend the model, the statistical significance of his deficit measure is eliminated due to increased multicollinearity. Time is highly correlated with *B* (0.98), *P* (0.97), *CPR* (0.84), *GD* (0.86), *ND* (0.80), *GD** (0.91), and *ND** (0.86) for the 1954-85 period and similar correlations for the 1948-85 period. Regressing time against a constant, the first difference of the dependent variable and the right-hand-side variables yields an $R^2$ of 0.92 and significant coefficients for *DB, D* Y, and *GD.* In addition, Joines corrects his model for heteroskedasticity by weighting the variables by the reciprocal of the trend value of nominal GNP which is a function of time.

[15] The significance of the debt measures is not altered if $a_1$, $a_2$ and $a_4$ are constrained to be zero and a three-period lag of the unemployment rate is included in order to estimate a first-difference version of an equation estimated by Joines. The debt measures still are significant for each of the three time periods except for *ND** for 1961-85 In addition, estimates of the real measures of the four deficit variables reveal that all four deficit coefficients are significant at the one percent level for a one-tailed tests for 1948-35, and the *ND* and *GA* coefficients are significant at the live percent level for a one-tailed test for 1954-85.

[16] If the levels version of eq. (5) is estimated with *B, Y, CPR, P,* and *D* weighted by trend nominal GNP, the debt coefficients for *GD* and *ND* are positive and statistically significant at the five percent level for a one-tailed test for the 1948-85 and 1954-85 periods.

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