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CRUDE ESTIMATES OF THE EFFECTS
OF FEDERAL DEFICITS

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Macroeconometric studies generally find that federal budget deficits do little, if any, harm to the economy. Large macroeconometric models suggest that policies which permanently raise budget deficits, such as a reduction in tax rates or a liberalization of eligibility rules for transfer payments, will raise the path of real output. Their effects on inflation and interest rates are usually slight.^{1/} The first effect is due entirely to a movement along a (flat) Phillips Curve. The second effect reflects an increased demand for money stemming from a higher level of nominal income. Vector autoregressive models estimated over post-war data generally suggest weak relationships between deficits and major economic indicators.^{2/} Studies which directly estimate the relationships between deficits and output, inflation, or interest rates, meanwhile, also tend to suggest that deficits don't matter very much.^{3/} The findings seem so overwhelming that Beryl Sprinkel, undersecretary of the Treasury for monetary affairs, claimed he knew of no evidence that deficits matter for either inflation or interest rates.^{4/}

At least two explanations exist for these findings. The most obvious is that, historically, budget deficits haven't mattered much. This explanation is not easily dismissed. It maintains that the U.S. historically has

^{1/}See, for example, Miller-Rolnick's discussion of the CBO's macro-analysis which employs average multipliers from five macroeconometric models.

^{2/}See, for example, Miller [4].

^{3/}See, for example, Hein, Perry, and Weintraub.

^{4/}Sprinkel: "But that still leaves the first question as to whether deficits cause inflation. The evidence is very clear that they do not." (p. 469). Then to Representative D'Amours' statement: "And when you eliminate deficits, you have declining interest rates," Sprinkel responded, "I would appreciate it if you could show me the evidence on it, because I have looked and I can't find it." (p. 474).

followed a single balanced-budget policy in the sense that deficits recorded in any given year have implied offsetting surpluses in the future. If it is true that the interest on the incremental debt financing the deficits is paid by higher taxes in the future, then there is little difference conceptually between deficit financing and explicit taxation.^{5/} In this case it would not be surprising to find the data reveal weak empirical relationships between deficits and output, inflation or interest rates.

But that is not the explanation which forms the basis for this study. Rather, the position is taken that previous studies are flawed by a failure to distinguish between a change in deficits and a change in deficit policies. This explanation maintains that the U.S. historically has followed different deficit policies in the sense that higher deficits run over a number of years have not implied higher surpluses in the future. It is shown that post-war data are not inconsistent with the view that a policy of persistently higher deficits, which is in effect long enough to be understood by the public, leads to higher rates of inflation and interest and to lower real growth.

In the remainder of the introduction, some conceptual support for this view is given, the major shortcoming of previous studies is discussed, and possible approaches to overcome this shortcoming are indicated. In the body of the paper, the approach used here is described and the findings are presented. The paper concludes with a brief discussion of implications.

The view that deficits matter must be spelled out carefully. The view does not suggest, for example, that the data will turn up strong correlations between deficits and other major economic indicators over some set of frequencies. Under a given deficit policy, that is, a rule which describes

^{5/}See, for example, Sargent pp. 38-42 and Barro.

how taxes and expenditures are determined based on current information, the view suggests correlations between deficits and other economic variables will represent mainly the effects of common shocks. The signs and magnitudes of the correlations will reflect the historical importance of different types of shocks: e.g. demand vs. supply shocks. The view that deficits matter by itself then has little to say about correlations between deficits and other indicators under a given policy.

The view does suggest, however, that understood changes in the deficit policy rule will have predictable effects on the average behavior of major economic variables over long periods of time. It is argued here that a higher level of deficits year in and year out, which is used to finance larger current expenditures, can be expected to result in secularly higher inflation and interest rates and lower real output.

This view is supported by the following theoretical considerations.^{6/} Due to government restrictions limiting the liquidity of federal bonds, bonds are close substitutes for private capital and imperfect substitutes for fiat money. A persistent increase in deficits--one that by definition does not imply higher explicit taxes in the future--increases the demand for savings relative to the supply. Since the government borrows as much as it requires, savings to support private investment are reduced and some private capital is then driven out. With decreasing returns to capital in production, the substitution of government current expenditures for private capital expenditures raises the marginal productivity of capital, and this results in a higher real rate of interest and lower rate of real economic growth.

^{6/}This theory is worked out in Miller [3].

Higher deficits can lead to more inflation in three different ways. First, with a constant income velocity of money, the slower growth of real output caused by the deficits implies a higher rate of inflation for a given money path. Second, the increase in the growth of bonds to finance the higher deficits generally requires faster growth of money at some point in time to allow the government to service its debt.^{7/} Higher money growth then translates directly into higher inflation. Third, the rise in interest rates caused by the higher deficits encourages individuals to circumvent the government restrictions on bonds. This results in an increased liquidity of bonds and, thus, leads to an increased income velocity of money.

Whether deficits matter as this view suggests cannot be answered by previous macroeconometric studies, because they do not distinguish between a change in deficits and a change in deficit policies.^{8/} In fact, they must assume the variables in their models follow stationary stochastic processes in order for their estimation techniques to be valid. But, to assume that the deficit process is stationary is to assume that the deficit policy rule was unchanged over the period of estimation. Thus, these studies cannot answer the question they address: "do deficits matter?" If the stationarity assumption is valid, then they offer no evidence about the effects of a change in deficit policies. In contrast, if the assumption is not valid, then neither are the estimates. The latter would be just an intermingling of business cycle and policy change effects.

Even if the above distinction were made, it still would be necessary to disentangle the transitional effects of a policy change from its longer

^{7/}See, for example, Sargent-Wallace or Miller [2].

^{8/}This is just the Lucas critique [1] all over again.

term effects. The two could be different if the change in policy were not adequately anticipated or understood. The transitional period would persist until people became familiar with the new policy process. The theory that deficits matter assumes people have knowledge of the policies in place. If this assumption is not met, the theory cannot predict the policy outcome.^{9/}

There seem to be two valid approaches to quantitatively estimating the effects of a change in deficit policies. The first is to estimate a structural model. However, "structural" here means that the model must be constructed from an explicit theory of individual behavior and must include estimation of parameters in individual objective functions. For as Lucas and Sargent so convincingly argued, neither aggregate nor individual excess demand functions can be expected to remain invariant to a change in policies which impinge on individual budget constraints. The econometric problem in this case is to identify the parameters of individual objective functions and budget constraints and then determine analytically how the demand functions change when policies change.

The second valid approach is to directly examine the effects of different deficit policies in place in the past. The aim is to identify breaks in the policy rule and then examine how the economic system behaved on average over the periods before and after the breaks.

While these two approaches seem valid for addressing the "do deficits matter?" question, neither is likely to provide a decisive answer any time soon. The first approach appears to exceed current research capabilities. It requires the formulation and estimation of general equilibrium models with endogenous roles for money and bonds. While models of this type

^{9/}For an elaboration of this point, see Lucas [2].

now are being constructed, they are probably too simple to confront the data.^{10/} Most, for example, abstract from business cycle movements and focus on steady states. Moreover, the identification and estimation problems associated with a model having a sizable number of equations are likely to be very severe.^{11/}

Although the second approach is less demanding, it is more limited because of an inadequate number of observations. Under this approach, an observation covers a period of time for which a single deficit policy has been in place. Thus, one observation is likely to be measured in units of ten years or more.^{12/} In order to obtain enough observations to directly estimate the effects of different deficit policies, it is then necessary to go across countries or to go way back in time for a given country. In either case, the observations could well be contaminated by important differences in economic structure.

Method and Results

The method used in this paper to estimate the effect of deficits is a crude application of the second approach described above. It is conjectured that differences in economic performance over substantial periods of time can largely be explained by differences in federal monetary and budget policies. The method is crude for at least two reasons: first, no attempt is made to estimate policy rules and test statistically for breaks in the rules; and second, the number of observations is so small that the estimates must be

^{10/}See, for example, Models of Monetary Economies.

^{11/}See Hansen-Sargent.

^{12/}In Miller [4], one break in the deficit policy rule is found for the whole post-war period.

considered very unreliable. Despite the crudeness of the method, the results suggest the view that deficits matter should not be rejected out of hand.

The method is to estimate a reduced-form model of the average performance of real GNP (RGNP), the GNP deflator (GNPD), and the 90-day Treasury bill rate (RTB) over equal subperiods of post-war data. The average performance measure for real GNP and the GNP deflator is the average annual growth rate ($g(\cdot)$), while the measure for the bill rate is the average level over the subperiod. There are four subperiods of $8\frac{1}{2}$ years each. The year 1948 is the base year. Values of variables for 1982 are taken from the Congressional Budget Office's baseline forecast made in the spring of 1982.

The independent variables of the model are indicators of monetary and budget policies. The monetary policy indicator is the average annual growth rate in the St. Louis Federal Reserve Bank's measure of total reserves adjusted for changes in reserve requirements ($g(\text{TR})$). The budget policy indicator is the average annual growth rate in outside federal debt ($g(\text{DEBT})$). The debt series is built up by taking total public debt net of government account holdings in 1948 as the initial value and adding to that the accumulated NIA deficit. The two indicators are intended to track the growth in outside debt: noninterest bearing and total interest and noninterest bearing, respectively.^{13/}

The estimated model is presented in Table 1. There are four observations, and thus only one degree of freedom. R-squared adjusted for degrees of freedom is reported after each equation, and t-statistics are reported in parentheses under each coefficient.

^{13/}As shown in Bryant-Wallace and Miller [1], the growth rates of outside money and total outside debt are appropriate measures of monetary and fiscal policies, respectively. NIA deficits exclude asset exchanges.

Table 1

Estimated Model

- (1) $g(\text{RGNP}) = 3.83 - .18g(\text{DEBT}) + .05g(\text{TR}); \bar{R}^2 = .972$
 (36.53) (-10.19) (1.59)
- (2) $g(\text{GNPD}) = 1.97 + .56g(\text{DEBT}) + .13g(\text{TR}); \bar{R}^2 = .953$
 (4.16) (7.26) (0.89)
- (3) $\text{RTB} = 2.02 + .70g(\text{DEBT}) + .33g(\text{TR}); \bar{R}^2 = .994$
 (9.08) (19.07) (4.69)
- (4) $\text{Real R} \equiv \text{RTB} - g(\text{GNPD}) = .05 + .13g(\text{DEBT}) + .20g(\text{TR}); \bar{R}^2 = .260$
 (0.08) (1.17) (0.90)

Actual and predicted values of each variable over the sample period are given in Table 2. The predictions are generated by using the model above with the actual values of the independent variables.

Table 2

Actuals (A), Predictions (P), and In-sample Prediction Errors (A-P)

<u>Period</u>	<u>Average Annual Growth Rates</u>						<u>Average Levels</u>					
	<u>Real GNP</u>			<u>GNP Deflator</u>			<u>90-Day T-Bill Rate</u>			<u>Real Interest Rate</u>		
	<u>A</u>	<u>P</u>	<u>A-P</u>	<u>A</u>	<u>P</u>	<u>A-P</u>	<u>A</u>	<u>P</u>	<u>A-P</u>	<u>A</u>	<u>P</u>	<u>A-P</u>
1956 1/2 /1948	3.9	3.9	0.0	2.2	1.8	0.4	1.7	1.8	-0.1	-0.5	0.0	-0.5
1965/1956 1/2	3.8	3.9	-0.1	1.8	2.2	-0.4	2.9	2.7	0.2	1.1	0.5	0.6
1973 1/2 /1965	3.6	3.6	0.0	4.7	4.5	0.2	6.0	6.1	-0.1	1.3	1.6	-0.3
1982/1973 1/2	2.2	2.2	0.0	7.8	7.8	0.0	9.7	9.7	0.0	1.9	1.9	0.0

Addendum

Average Annual Growth Rates

	<u>Total Debt</u>	<u>Total Reserves</u>
1956 1/2 /1948	-0.1	-0.3
1965/1956 1/2	0.1	1.8
1973 1/2 /1965	3.2	5.6
1982/1973 1/2	9.9	2.3

Finally, the model is used to forecast the next four-year period assuming that the NIA deficit is \$150 billion per year and that the growth in total reserves is 4 percent per year. The deficit assumptions are in the range of the estimates in the Congressional Budget Office's September 1982 budget update. The total reserve assumption is taken to be roughly consistent with the Federal Reserve's stated objectives. An implicit assumption is that the experience of the next four years will be representative of the entire 8 1/2 year period. The forecast is reported in Table 3.

Table 3

Model Forecast for 1986/1982

<u>Average Annual Growth Rates</u>		<u>Average Levels</u>	
<u>Real GNP</u>	<u>GNP Deflator</u>	<u>90-Day T-Bill Rate</u>	<u>Real Interest Rate</u>
0.8	12.6	16.0	3.4
-----Assumed-----			
<u>Total Debt</u>	<u>Total Reserves</u>		
18.1	4.0		

Interpretation of Results and Implications

According to the model, budget deficits matter. Higher deficits, which result in faster growth of government debt over a period of time, result in lower real growth, higher inflation, higher nominal interest rates, and higher real interest rates. Except for the effect of deficits on real interest rates, all other relationships are highly statistically significant. The small effect of deficits on real interest rates may indicate that in the aggregate there are only slightly decreasing returns to capital in production. The model assigns little explanatory power to monetary policy, with the exception of nominal interest rates. The statistical explanation for why relatively more weight is given to budget policy than to monetary policy is apparent from Table 2. The acceleration of the growth in total debt comes much closer to matching the accelerating deterioration in the dependent variables.

The model's predictions for the next four years are very pessimistic. That is hardly surprising given the large weight the model gives to deficits. If NIA deficits average \$150 billion per year over the next four years, the annual average growth in outside debt over this period will be nearly twice that of the preceding 8 $\frac{1}{2}$ year period.

The findings of this study imply that there are macroeconomic grounds for worrying about the large projected budget deficits. This study in no way proves that budget deficits do harm to the economy. Due to an insufficient number of observations, the estimates are extremely unreliable. What the study does show, however, is that the data are not inconsistent with the view that deficits matter. That view should not be summarily dismissed.

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